

Five centuries of farming

A short history of Dutch agriculture 1500-2000



Mansholt publication series - Volume 8

Jan Bieleman

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Preface

The basis of the text before you was my book *Boeren in Nederland; geschiedenis van de landbouw 1500-2000* which was published in the spring of 2008: a history of farmers and farming in the Netherlands during the past five centuries. This book in turn was an extended and elaborated edition of my *Geschiedenis van de landbouw in Nederland 1500-1950; veranderingen en verscheidenheid* that appeared in 1992. The latter was intended mainly to be a textbook for Dutch students at the former Agricultural University of Wageningen (now Wageningen University), taking the course 'Agrarian History' for which I was responsible from the mid-1980's onwards. The book was made possible thanks to the pioneering and modern agro-historical studies that have been published since the 1960's.

This new English text is in fact a shortened version of 'Boeren in Nederland' and by no means a straightforward translation. I have tried to adapt the original text to one which is – I hope – a more suitable one for foreign scholars and students visiting Wageningen University in particular, who may not be familiar with the more specific (geographical) features of this country. For this reason I have reworked the original text leaving out details that might confuse the overall view but without losing the aim of giving an impression of the rich variety in Dutch farming life in the past. What may be called a characteristic of this book as well as its two Dutch predecessors is the rather strong agronomic approach I have chosen. It is indeed very much what some British agro-historians have called a 'cows and ploughs history'.

Now that the English edition has arrived I must address a special word of thanks to my British colleague Paul Brassley (University of Plymouth) who was kind enough to go through the manuscript thoroughly to check my translation of the agronomic and agro-historical technical terms and jargon. He took the job I burdened him with very seriously. Also my Swedish colleague Janken Myrdal (Sveriges Landbruksuniversitet, Uppsala) read parts of the manuscript and made several remarks on the text for which I am very grateful.

A special word of appreciation goes to Boom Publishers in Amsterdam which approved the idea of publishing this shortened English edition of the 2008 book. Many thanks also to the board of editors of the Mansholt Publication Series which so generously included the book in their series. And finally I must thank the editing team of Wageningen Academic Publishers that transformed a complex manuscript into a printable book!

Jan Bieleman – Wageningen
Winter 2009/2010

Introduction

A framework for interpretation

Where the lower reaches of the Rijn, Maas and Schelde rivers passed through the Northwest-European plain and finally flowed out into the North Sea, a unique country of towns had come about during the Late Middle Ages. Ever since then, due to its natural and central location, this country had turned into a true crossroad of European trade connections between east and west, north and south. A highly urbanised country emerged and as the urban economies flourished they had a great impact on the surrounding countryside, affecting the rural community and stimulating all kinds of agrarian activities.

As a result, in the midst of this towns-land a great variety of farming systems emerged, eventually developing successfully over some five centuries into highly productive agribusiness complexes. At the end of the 20th century Dutch agriculture and horticulture was ranked as one of the most productive in the world. Nowhere else did cows give as much milk as Dutch cows, and in arable farming and horticulture, productivity per man-hour was amongst the highest known. The aim of this book is to give an overview of the historical process of five centuries of farming that led up to this.

Agricultural history

Looking back over time, in search of long-term developments in farming it is not totally incorrect to assume that in some distant past there was a lack of any kind of dynamism so typical for the times we live in now. For a long time scholars in social-economic history indeed believed that, before the arrival of artificial fertilisers and mechanisation, before agricultural sciences helped to boost production – say, roughly, before the end of the 19th century – farming was primitive and barely evolving.

Eighteenth- and 19th century armchair farmers and publicists regarded the farmer as a creature that worked his fields and tended his animals in an ‘ancestral rut’. They took his methods and attitude for denseness and an unwillingness to change. All too readily, these ideas were adopted later on by publicists as they went along with the low opinion farmers enjoyed in the public eye. The timeless image of the eternally slogging peasant also appealed to all kinds of vague, romantic ideas about what rural life in the past must have been like. It was a representation that – not completely unintentionally – was emphasised later on in the publications of serious scientists that appeared when modern agricultural sciences came on the scene and boosted productivity. Often, these publications widely expatiate the many innovations that emerged in this era, comparing them with the ‘traditional’¹ methods of farming, and presented them as being static and unchanging. And until the 1950’s social

¹ The concept ‘traditional’, as it is used here, is meant to characterise farming before the era of large-scale use of modern inputs, such as fertilisers, concentrates bought from outside the farm and combustible fuel to power machinery and implements; in fact, before fossil energy was applied on a large scale as a source of power. Others talk in this respect about ‘organic agricultural technology’.



Illustration 0.1. A so-called kapberg near the village of Warnsveld (near Zutphen).

Around 1900 the photographer Hoetink from Gelderland took this picture. In the eastern parts of the country kapbergen were used for storing the grain harvest (mainly rye) as on this photo, as well as for storing hay. Very typically the roof of a kapberg could be raised and lowered and as such adapted to the volume of its content to protect it from the weather. Source: Staring Instituut Doetinchem.

scientists – amongst them historians as well – and ethnologists eagerly propagated the idea of an unchanging rural society.

Yet, it is clear that rural life in the past was only static and changeless when measured against the yardstick of our current society. It is inaccurate to compare the unarguably less dynamic pace of that ‘traditional’ society with the hectic activity of the present-day. The same goes for farming. The universal historical principal of evaluating (historical) phenomena in the context of their own time should certainly be applied to the history of agriculture and farming. When that is done it appears that the so-called ‘traditional’, rural society was less rigid than we think.



This book is about the history of farming in the Netherlands. In the literature on the subject, the terms ‘agrarian history’ and ‘rural history’ are often used synonymously with the term ‘agricultural history’. Yet, the three concepts are not identical. In fact, they can be seen in a sort of hierarchical relationship to each other. In this book agricultural history

will be interpreted schematically as part of a circular set, consisting of three concentric zones.² The innermost circle relates to subjects in the field of the history of agriculture on a farm level. One could also call this historical agronomy. It is about the history of tillage (ploughing), manuring, crops, crop yields, livestock, breeding, implements, farm buildings, mechanisation, etc. The second, wider circle is agricultural history in a broader sense and it is here that some speak of agrarian history. It deals with the history of farming in its economic and social context, where individual farm management has a relationship with markets, price mechanisms, labour costs, tax burden, free holding and tenancy, common farming institutions, cooperatives, farmers' societies and more. The outer circle is in fact about the history of the whole rural community. This is the realm of rural history and here we come across subjects of a political, social or cultural nature, rural institutions, rural crafts and trades, shopkeepers, transport, etc. Rural demography can also be included in this outer circle. Seen from this perspective, the book is mostly about what happened in time in the two inner zones and we will place most emphasis on what went on in the second zone. However, every now and then elements of the outer circle will also be discussed.



This book covers the history of five centuries of farming in the Netherlands. Its main theme is about the development of agriculture on a farm level, as it was influenced by the ever-changing social, economic and technological environment. The course of change will be dealt with in terms of a continuing process of intensification, through which ever more 'labour' and/or 'capital' was deployed in order to increase production. However, this may be the overall result in the end; it is certainly not a straightforward, unilinear process. There was often a reverse trend when farmers, forced by a changing economic situation, had to extensify their farming practices.

What do the twin concepts 'intensive' and 'extensive' actually imply? In general, farming is specified as 'extensive' when a large area of land is used in relation to the deployed amount of 'labour' and 'capital'. Conversely, in an intensive form of farming a large amount of 'labour' and 'capital' is usually applied in relation to the area of land. Yet, both notions – 'intensive' and 'extensive' – only have a relative denotation, in relation to each other and no absolute meaning. When a certain form of farming is typified as 'extensive' it is only so in comparison with others. For instance, a farmer can put 10, 40 or 80 days of work into one hectare of land, or plough it 5, 10 or 15 times, or use 10, 50 or 100 kilos of a certain sort of fertiliser. These different levels of input can be interpreted as different stages of intensities of his farm management.

Used in a historical context, however, the above-mentioned approach is both too simple and too pretentious at the same time. Intensification of a current farming system could mean not only a quantitative increase in labour and capital, but often also – and more especially – a change in shape and balance between the two production factors. In addition to that,

² Slicher van Bath, 'De agrarische geschiedenis als wetenschap', 1962.

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the ‘capital’ factor can consist of a large variety of different elements: technology as well as implements, tools, cattle, manure, feed stuffs and knowledge.

Apart from this, it is vital to be aware that ‘intensification’ is not logically equal to ‘improvement’. In the past, the process of intensification often simply meant more work for many small farmers. And for a rural society as a whole³ intensification of farming frequently involved high ‘social costs’, as the social ladder was extended downwards, i.e. when beside the group of large, settled farmers there emerged a growing group of (almost) landless wage-labourers who often had to live under inconceivably poor, indigent conditions. Merely by using their labour, the large farmers were able to intensify their farming practise and increase their gross production.

The nature of farming

Over time, countless descriptions and definitions of the concepts of ‘agriculture’ or ‘farming’ have been formulated. In the early 1950’s the Dutch agro-economist Minderhoud, for instance, defined agriculture or farming as ‘the application of labour in combination with capital to nature in order to let it produce more useful plant and animals than it would produce without any interference’⁴ Other scholars talk about: ‘the human activity that produces useful organic material by means of plants and animals, with the sun as the source of energy’⁵ and still others simply refer to ‘applied ecology’.⁶ This last definition in particular brings us in all its succinctness right down to the essence of what farming really is. For, whether we talk about traditional or ultra-modern, highly industrialised, high-tech agriculture, farming basically boils down to managing, or at least trying to manage very complex biological processes. It is simply impossible to think of any form of agriculture that is not based on biological principles and processes. And in the end, it is these principles and processes that put a limit on the volume of what can be produced. Agricultural production is determined by the nature of reproduction processes of plants and animals, and all uncertainties connected to them. In many ways agriculture can be seen as the most fundamental interface between man, the earth and the plant and animal world. Or as the archaeologist Peter Reynolds once put it: ‘Farming does not just happen, whether it is ancient, historic or modern. It is an extremely complex process requiring great skill in balancing the different component elements, inputs and outputs, gambling against the greatest uncertainty of them all, the climate, and managing to have sufficient reserves to

³ Bieleman, ‘Farming system research as a guideline’, 1999.

⁴ ‘De toepassing van arbeid op de natuur om deze met medewerking van kapitaal te dwingen meer voor de mens nuttige planten en dieren voort te brengen dan ze zou opleveren, als ze aan zich zelf zou worden overgelaten’. Minderhoud, ‘Landbouw’, 1956, p. 627.

⁵ De Wit, ‘Introduction’, 1986.

⁶ Zadoks, ‘Landbouw tussen oecologie en economie’, 1985, p. 377.

survive the worst possible outcome.’⁷ And it is all this that makes agriculture fundamentally different from all kinds of other industrial production processes.



Farming is also – and in particular – a human activity. It is man who, with the input of labour, land and capital, tries to force nature to produce vegetable and animal products, and in order to do so, knowledge about these processes is crucial. Farming therefore also has economic, social and cultural aspects which create a very complex issue/phenomenon.

For centuries, the knowledge required to manage the biological process that constitutes agricultural production was based on the experience of the farmer and that of his preceding generations. And it was this experience that was his guide in daily practice. Based on this experience, he knew – for instance – that a certain field of his farm was more fertile than another and that an extra manure application could lead to a higher yield, or not. Based on his experience all kinds of different crop rotations had evolved in time. Consequently, unmistakable professional skills evolved, built from a combination of experiences, tradition, insight and schooling on the parental farm.

However, the techniques that he applied may have been known to be effective, but why they were so was often a mystery to him.⁸ Yet, his sharp observations and the element of chance led to important improvements in time. In general, farmers were constantly trying to improve their farming business, to increase production and productivity. These improvements were realised step by step, in a continuing process of trial and error. The fact that in some distant past, for instance, the yields of all kind of crops were so low in comparison with the yields we witness today, was not caused by a lack of skills, but simply by the absence of modern inputs like fertilisers, pesticides and highly improved crop varieties.

In the past, within the regime of traditional farming, the possibility of increasing crop productivity or improving the livestock performance was limited. All the more spectacular and essential, therefore, when farmers did manage to increase their output by a few percent. And as long as labour was available in abundance, the increase in output per unit of land was much more important than per unit of labour.

So, for many centuries the farmers’ workmanship was based on his empirical knowledge. Yet, all this would change fundamentally in the 19th century, or rather the second half of that century. Because one of the most striking occurrences in the long-term development of agriculture at that time was the scientification of knowledge in the field of agricultural production. It made this new period fundamentally different from the preceding era. From this moment on, the young and rapidly developing agricultural sciences had a vast impact on production and productivity. They revealed not only the biological principles and processes involved in plant and animal production, but later the activities on the farm and the technologies that were applied there, also became the subject of scientific research.

⁷ Reynolds, ‘Ancient farming’, 1987, p. 49.

⁸ Shiel, ‘Improving soil productivity’, 1991, p. 51.

Malthus vs. Boserup

The image of frozen, immutable methods of farming, an agriculture that hardly evolved and was barely able to feed a growing population, was fostered to a great extent by the work of the 18th century Scottish economist Thomas Robert Malthus (1766-1834). He published his views on the field of tension between population growth and the increase in resources or food production for the first time in 1798, in his famous book 'Essay on the principle of population'.

Malthus believed that the growth of the means of subsistence could not keep up with the population increase. A continuing increase in the farming population would not result in an equal increase in agricultural production, due to the law of diminishing returns because he made the assumption that agricultural production methods were immutable. Consequently he presumed that (unchecked) population growth would always exceed the growth of the means of subsistence. The actual (checked) population growth is kept in line with food supply growth by 'positive checks' (starvation, disease and the like, elevating the death rate) and 'preventive checks' (i.e. postponement of marriage, etc., that keep down the birth rate). His hypothesis implied that the actual population always has a propensity to push above the level of food production.

In the last few decades this black and highly pessimistic view on the field of force between population growth and resources has made way for a much more positive and optimistic one, as (agricultural) historians became aware of the fact that farming techniques were not as immutable as their predecessors believed. This shift in thinking was strongly influenced by the work of the Danish development economist Esther Boserup (1910-99). In 1965 she published her book 'The conditions of agricultural growth', arguing that food production not population growth is the dependent variable.⁹ This theory was based on her own empirical observations of so-called 'primitive' farming communities as she worked in developing countries. She took the view that population growth is not the *result* of increasing resources, but the *cause*. According to her ideas population pressure is the 'prime mover' for technological changes in farming, thus for agricultural change, and she assumes that a farming population applies new techniques and implements after considering the effect of an increase in productivity and an increased input of labour.

The pace of change or the 'secular trend'

Ever since the Late Middle Ages the daily menu of broad swathes of the European population increasingly consisted of vegetable products, and cereals in particular. Cereals not only provided flour to make bread, they were also an essential component of cooked meals like porridge or mash, or they were used for brewing beer, which in those days was the number one drink. In terms of bread grains, wheat and rye were the most common. Other crops like barley, oats and (later on) buckwheat were used to make porridge or cakes. The surplus,

⁹ Boserup, 'The conditions', 1965.

however, that farmers were able to produce, or rather the part of their production that reached the market – one way or another – was small. Consequently, a crop failure – and they occurred very frequently – often had serious consequences, especially for those who had to buy their daily bread ‘on the market’, i.e. the citizens. As such, a crop failure usually led to a sudden and significant price increase. No wonder then that in a society based on grain as a staple food a series of periods of abundance, scarcity and ultimately deficiency led to violent fluctuations in the price of grain. In a European context, it was not unusual for the price of grain to go up four, five, or even nine times the normal level, in just one or two years. Yet, in the Netherlands a tripling of the grain price was already a rarity. In fact, such strongly fluctuating cereal prices were very much a characteristic of the pre-industrial era, a time when crop failures occurred with painful regularity.

Yet, no matter how dramatic those years with extremely high grain prices may have been for large numbers of the population, they were of less importance for the development of farming itself in the long term. In this respect, the long-term development of cereal prices – and more generally the price development of agricultural products – is decisive. As historians came to understand that farming may have been less rigid and immutable than their predecessors believed, they began to focus their attention on these long-term analyses of price series. In so doing, these price series soon proved to be an eminent instrument for getting a grip on the pace of change of society as a whole in the long term. They proved to offer them a perfect tool to get a grip on the pace of change in time and the more structural and underlying trends in the long term history and the joys and woes of farming and society.

And as historical demography and related historical disciplines uncovered new perspectives on and insights into the long-term population development and while agrarian historians learned to handle all kinds of (quantitative) historical sources they had thus far neglected, ever more penetrating questions could be raised as to the nature of the field of force between population growth and resources (or to be more specific: food production) – and answered!

Following agrarian-historians like Abel and Slicher van Bath, it became clear that the long-term social-economic history of large parts of Europe could be ordered according to a wave-like alternation of long-lasting periods of economic and demographic boom and bust that lasted about one, one and a half centuries or even longer. In fact, it proved to be all about an undulation with a much longer frequency than economists had previously thought: a cyclical succession of long periods of economic and demographic growth and decline or at least stagnation. In many ways it proved to be a sort of wave on which the long-term history of the European society was carried.

This unique sequence of phases of growth and stagnancy, and then decline, of economic expansion and contraction was called the ‘secular trend’ (Figure 0.1). The prefix ‘secular’ was derived from the Latin word *saeculum*, which literally means ‘century’.¹⁰ This, however, does not imply that the consecutive phases of expansion and contraction always took precisely one century, but that they covered periods of one hundred years or longer. In fact, in many

¹⁰ Abel, ‘Agrarkrisen und Agrarkonjunktuur’, 1978.

Introduction

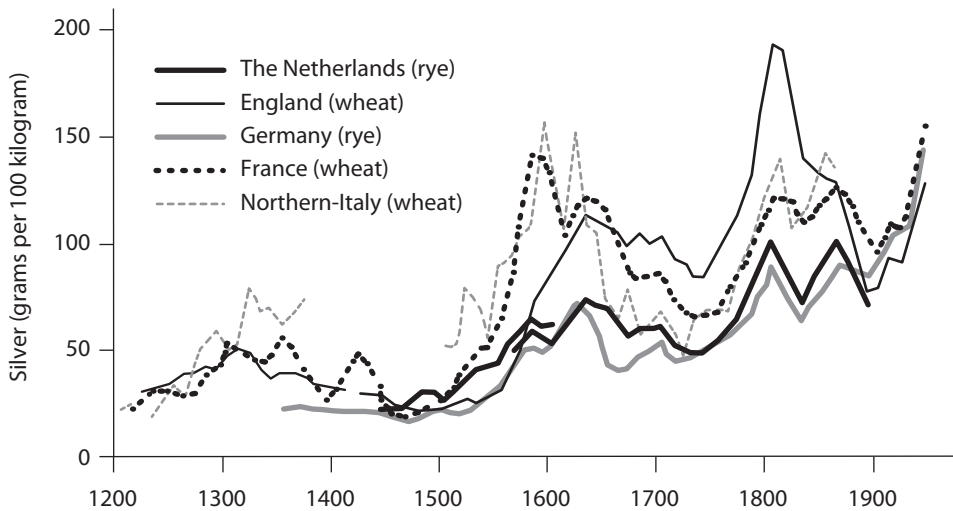


Figure 0.1. The 'secular trend' as it takes shape in the price of grain (wheat and rye) in grams of silver per 100 kg in the Netherlands, England, Germany and Northern Italy, from the 13th until the early 20th century. Source: see Bieleman, 'Boeren op het Drentse zand', 1987, p. 742, ref. 212.

ways the 'secular trend' can be seen as the time dimension of the 'Malthusian' field of force between population growth and resources, or food production.



The 'secular trend' is usually represented as beginning around 1100 with a period of expansive economic and demographic growth that continued up to about 1350. It was an era in which the European population rapidly increased, vast areas of land were reclaimed and developed, many towns emerged and prospered while international trade flourished (the Hanseatic League). During this period of two and a half centuries the European population increased from c. 16 to 35 million people.¹¹ Here, in north-western Europe, Flanders and its towns like Ghent, Bruges, and Ypres became Europe's economic heartland as the highly urbanised economy stimulated agriculture to develop to unrivalled standards.

Around the middle of the 14th century a downturn occurred and from 1350 until about 1500 – some historian prefer the year 1450 – a period of serious economic and demographic decline came about. Large parts of Europe became depopulated and manifested in phenomena like the infamous 'Black Death', 'deserted villages' in England and *Wüstungen* in Germany.

¹¹ These figures are based on: McEvedy and Jones, 'World population history', 1978. We included northwestern Europe: Norway, Sweden, Denmark, the British Isles and Ireland, the Netherlands, Belgium and Luxembourg, France and Germany.

In the course of the oncoming 16th century a new era of demographic growth occurred. Cities like Antwerp and subsequently Amsterdam and others in the northern Netherlands developed into dominant centres in the international economic field of force, as the economy in the coastal provinces, Holland, Zeeland and Friesland in particular went through a period of extraordinary growth, especially after 1580. It was an era in Dutch history which became known as the *Gouden Eeuw* or the 'Golden Age'. As this happened the centre of gravity of the north-western European economy shifted from the southern to the northern provinces of the then Netherlands.

For a long time, scholars in Dutch history described the fame of this period merely in terms of an unprecedented growth and a flourishing of culture, arts and trade, in many ways culminating in the wealth of the city of Amsterdam. More recently however, it has become clear that farming also went through a remarkable transformation and is recognised as one of the driving forces behind all the cultural, social and economic expansion.

However, these expansive developments, which lasted until the middle of the 17th century, were not merely a Dutch, 'national' phenomenon; far from it. They were part and parcel of a period of demographic and economic growth that swept across north-western Europe after the end of the Middle Ages. As the European population increased from c. 33 to 46 million people the demand for all kinds of agricultural products increased. As a consequence their price rose as did the cost of living. And as this happened most Europeans sought a cheaper diet, causing the demand for the most elementary food products, in particular cereals, to rise. It was for this reason that the German agrarian historian Wilhelm Abel once called this era 'the century of the cereals', stating: '*Das 16. Jahrhundert wurde das Jahrhundert des Getreides schlechthin*'.¹²

However, after the mid-17th century, the scene changed. The Dutch urban sector began to stagnate or even decline and growth of the population on a European scale also slowed down. Consequently, agricultural prices fell. It was all part of a long-lasting, secular depression that lasted from the mid-17th century to the mid-18th century. As a result, Dutch agriculture was forced to face a long period of declining revenues lasting about one hundred years, a situation that was worsened by the fact that farming costs increased simultaneously, due to heavy taxation, risen water management costs and an increase in the cost of labour. However, the scissor-like movement of falling income and rising costs did not lead to less developed forms of agriculture. On the contrary, Dutch farming retained its high standards, where these were well known. Farmers were however forced to adopt various forms of re-adjustment, which eventually implied some essential improvements, from which they at least benefited when the long-term economic situation recovered after 1750.

From the middle of the 18th century, and as a part of a comprehensive complex of changes that became known as the 'Industrial Revolution', the European population began to increase again. This time with unprecedented speed, in a continuing trend until the present time. Between 1650 and 1750 the population had only slowly increased by just 11 million, from 46 to 57 million. One century later, however, in 1850, this number had risen

¹² Abel, 'Stufen der Ernährung', 1981, p. 33.



Illustration 0.2. Painted panels from a series of portraits of farm women attributed to J. (van) Horst (around 1570) represents various farming sectors in the province of Holland.

The farmer's wife from the village of Hoogwoud is depicted holding cheeses, like the lady from Oudendijk (near the town of Hoorn). The lady from Wadway (also near Hoorn) holds a churn and plunger and her colleague from the village of Broek (a village well known for its horticulture) a bundle of onions and a basket filled with carrots. Source: Rijksmuseum Amsterdam.

as much as 105 million and afterwards to 200 million in 1950; and by the end of the 20th century it had risen to almost 250 million.¹³ And as the population grew and the demand for agricultural products increased, the prices of all kinds of agricultural products rose again from 1750 onwards. Accordingly, the secular trend began a new phase of expansion.

However, in contrast to what happened in earlier centuries and to the trend population growth showed from then on, secular price development appeared to change into a price trend with a much shorter periodicity. What is more, the direct and long-term relationship between the dynamics of population growth and the development of agricultural prices which were so characteristic of the pre-industrial society, seemed to disappear thereafter. Or to put it another way: the secular trend seemed to dissolve. Broadly speaking, one could say that this period marks the transition from the 'old' agrarian society into the 'new' industrial society. Economic historians have since named this much shorter cyclical wave, which occurred in the up and downward movement in economy, the 'Kondratieff business cycle', after the Russian economist Kondratieff.

As such this Kondratieff cycle, with a periodicity of 50 to 60 years seems to be the result of a new and different economic field of force. It looks as though food production – or agricultural production – was finally able to keep pace with the growth of the European population. Apparently European society had managed to escape the classical 'Malthusian' constraint food production had set on population growth. The 'Malthusian ceiling', which had determined population growth for centuries, had vanished from sight – at least for the time being.

For some time, this was the result of a complex of technical changes in north-western European agriculture itself. One of the major innovations of this era was the spread of the potato as staple food for millions of people. The spread of turnips and clover as fodder crops was also a major innovation in that sense, all the more due to the effect the latter had on the nitrogen supply in the soil. It is for that reason that some agricultural historians compare the role of clover in boosting soil productivity with the importance of steam power in the Industrial Revolution.¹⁴

Later on the massive imports, at first from southern Russia and the Ukraine (the land of the 'Black Earth') and later – that is to say after the 1860's – from the 'New World', became crucial for supplying the Europeans with bread grain and making them less dependent on their own production. The growing flow of grain from North America in particular, caused prices to fall, and – crucially – kept them low (!), especially in comparison with the prices of other products. It enabled consumers to spend an ever smaller part of their income on obtaining their basic foods. As a result their prosperity slowly increased, and they had increasing financial freedom to buy a broad variety of more 'luxury' agricultural and horticultural products. Consequently the demand for these products rapidly increased.

In addition to all this, the young and rapidly evolving agricultural sciences was having an increasing impact on the sector, while at the same time governmental influence and its grip

¹³ McEvedy and Jones, 'World population history', 1978.

¹⁴ Chorley, 'The Agricultural Revolution', 1981.

on the agricultural sector increased, intensified and deepened. This was especially so after World War II when a period of matchless economic growth began. As wages were rapidly increasing and labour became ever more expensive, agriculture changed rapidly under the influence of a sweeping complex of processes that can be characterised by the concepts of mechanisation, intensification, rationalisation, specialisation and up-scaling. Never before had there been more people involved in agricultural production than around 1950. Between 1850 and 1950 their number had increased from 543,000 to 716,000, or about 19% of the total Dutch workforce. Since then, however, these numbers have fallen to only about 236,000 in the year 2000, that is to say less than 3% of the total workforce!

Spatial diversity in farming: the Von Thünen model

Looking over five centuries of farming in this country, one striking and prominent feature was – and still is – its great variety of different types of agriculture on a small area of land. The basis for the wide range of highly developed farming systems was largely the result of a rich mosaic of geological landscapes and soil types. In fact, for those familiar with the characteristics of this country, the diversity of landscape is one of the most striking characteristics of its geography, which is actually a huge river delta of the Rijn, Maas, Schelde and some smaller rivers.

Soil conditions were indeed an important determining factor for the rich variation of farming systems that evolved over time. There was, however, another, more abstract factor that had a major impact on the variety in Dutch farming, namely a virtual field of force similar to the classic allocation model formulated by the German economist and large landowner J.H. Von Thünen (Figure 0.2), author of 'Der isolierte staat' or 'The isolated state', from 1826. In a time when industrialisation had had a relatively minor impact upon European agriculture and horse-drawn haulage was still the prevailing mode of transport, he argued that the cost of transporting agricultural products to market was the major determinant both of the intensity with which the crop was grown, and the combination of crops that a farmer would grow or products he would produce. 'With increasing distance from the town, the land will progressively be given up to products cheap to transport in relation to their value', Von Thünen wrote.¹⁵

In his model Von Thünen assumed one big town, which was the market for a large and physically homogeneous area. As the distance to this market town increased, increasing costs of transport led to a variety of farming systems which were ordered according to a concentric set of circles around the town. The closer one got to the town the more intensive the character of farming became.¹⁶

In practice, farmers were very well aware of the fact that transport costs were an important factor, as was remarked in an early-19th description of agriculture in the province of Gelderland. It read: 'the expenses to bring grain from the eastern-most parts of the

¹⁵ See: Chisholm, 'Rural settlement and land use', 1973, pp. 13ff.

¹⁶ See also: Grigg, 'The dynamics', pp. 135-150.

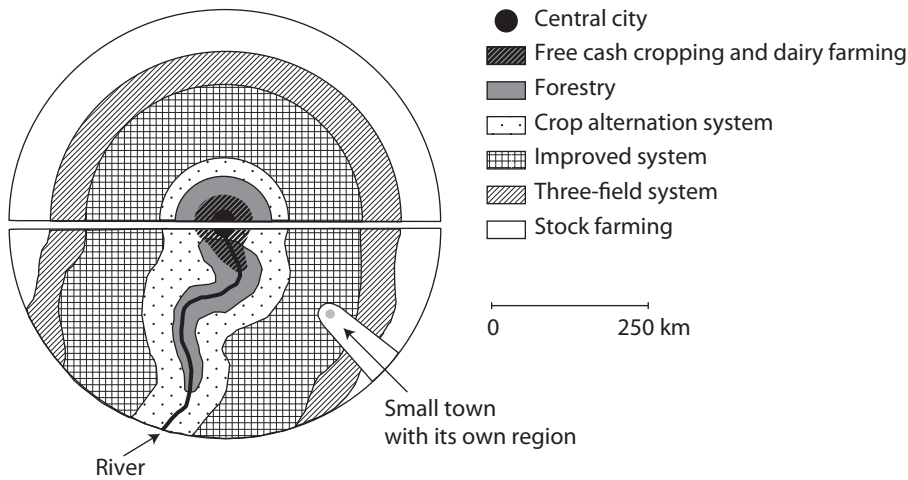


Figure 0.2. Johann Heinrich Von Thünen's model of an Isolated State (*der Isolierte Staat*) from 1826. The German (agricultural) economist studied the relationship between the character of farming in a certain region and its distance to the dominating market town, with the cost of transport as the most important determining factor.

district of Zutphen [in common place parlance usually called *De Achterhoek*], for example from Aalten or Winterswijk to the market towns of Zutphen or Deventer takes at least 20 guilders for each *last* [= 30.1 hl], so that this grain arriving in Amsterdam is burdened with almost as much in advance costs as the grain that is brought in by ship from the Baltic.¹⁷

Von Thünen never meant the 'Isolated state' to be something that could really exist; indeed he originally planned to call his work *Der ideale Staat* or *The imaginary state*. He was very much aware of the fact that the geological substrate was never as homogeneous as his model suggested. Yet, his model is still an important instrument as it helps us to explain some of the features of the agricultural and economic geography of pre-industrial Europe. It has proven to be a fruitful framework for understanding the nature and intensity of 'traditional' farming systems in relation to their location. In that way historians have argued that in the course of the 'long 16th century' an interregional agro-economy emerged in north-western Europe that closely resembled Von Thünen's model in its spatial dimensions. They pointed out that – especially after 1580 – the Dutch coastal provinces with their highly urbanised economy and the city of Amsterdam in particular developed very much as the ultimate focus of this

¹⁷ Original Dutch text: 'De onkosten van het vervoer van granen uit het oostelijkste gedeelte des Zutphense kwartiers, bij voorbeeld van Aalten of Winterswijk, naar Zutphen of Deventer, niet minder bedragen dan twintig gulden voor ieder last, zoodat zoodanig koren, te Amsterdam komende, nagenoeg met evenveel voorkosten bezwaard is, als datgene, hetwelk te scheep van de kusten der Oostzee aangevoerd wordt'.

concentric zoning.¹⁸ So, although the great variety in geological landscapes and soil types did have a major differentiating impact on the variety of farming in this country, it is clear that the effect of this more abstract Von Thünen field of force as it emerged from the 16th century onwards, may have been just as decisive. Some scholars even go so far as to maintain that the impact of soil fertility on the character of farming in this sense is only relative. The agro-economist Brinkmann, for instance, once put it this way: 'a functional relationship between soil fertility and farming intensity which would have the same general significance as the dependence of farming on the favourableness of economic location, does not exist.'¹⁹

Agricultural districts

The first cartographic representation of the variation in Dutch agriculture was made by the Dutch agronomist and geologist W.C.H. Staring²⁰ (1808-77) in the 1860's. He qualified the diversity of Dutch agriculture in terms of farming systems meant to be a basis for a more adequately organised set of agricultural statistics. In its final version Staring's model included 42 separate districts, combined into 12 different farming systems, or *landbouwstelsels* as he called them. Staring's classification was used by the agricultural authorities and statisticians for more than three decades, until 1904. By the end of the 19th century it proved to be unworkable because of the major changes that had occurred in Dutch agriculture after the 1850's.

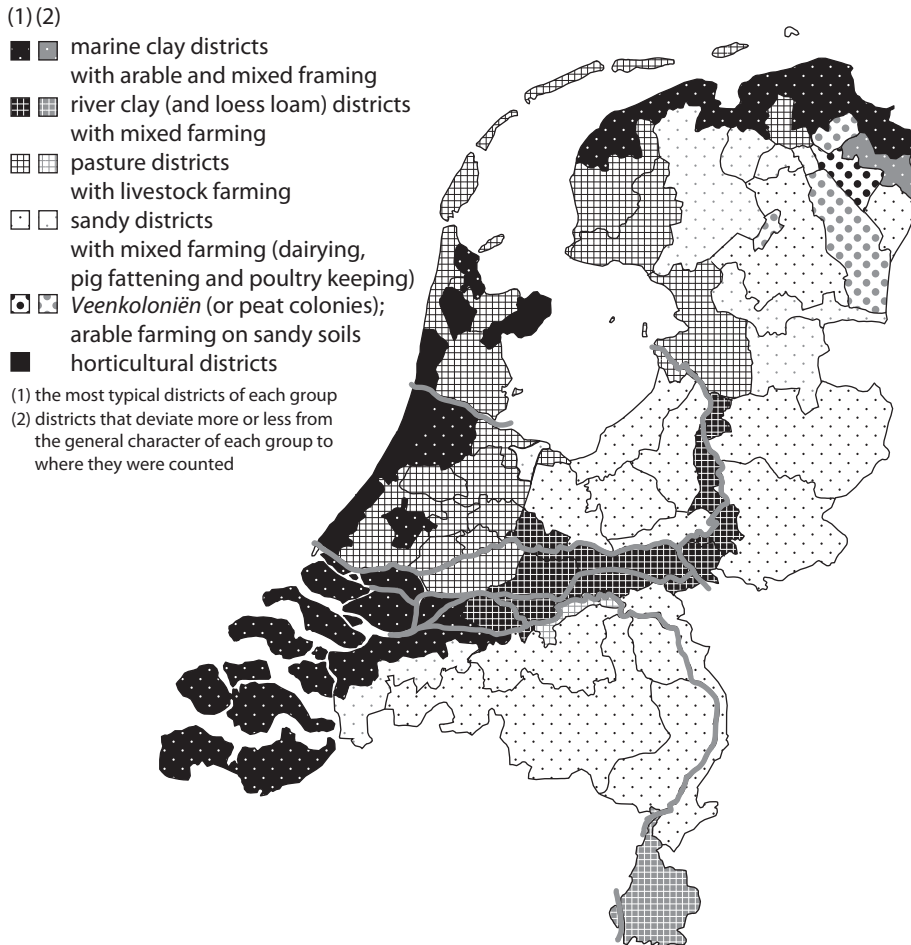
Consequently, in 1912 a new system was introduced together with the results of the first national agricultural census that had been held two years earlier, in 1910 (Map 0.1). As in Staring's classification, the municipalities again formed the smallest statistical units, of which there were 1,121 at the time. This time, however, it was not meant to be a classification into farming systems but into agricultural districts or *landbouwgebieden*, implying that it had a much stronger geographical signature. As such, the ratio between the area of arable land and the area of grassland, for instance, was handled as an important criterion and benchmark. In fact, more attention was given to soil types and land use than to the characters of individual farms. So this time the classification dealt with *de Zandgebieden* (the sandy districts) instead of *het Drieslagstelsel* (three course rotation system) as Staring had done 40 years earlier. As was being stated, the new compiler had tried to attain 'agronomic entities'.

In total 83 separate districts were distinguished, and grouped together into six *groepen van landbouwgebieden* (groups of agricultural districts):

¹⁸ Achilles, 'Getreidepreise und Getreidehandelsbeziehungen', 1959; Bieleman, 'Boeren op het Drentse zand', 1987, pp. 48-51; *idem*, 'De verscheidenheid', 1990; Recently a team of British historians pointed to the effect of the medieval metropolis London with its 80-100,000 inhabitants on the hinterland, resulting in a (more or less) concentrically structured sequence of agricultural specialisms in accordance with Von Thünen's ideas. Campbell, Galloway and Keene, 'A medieval capital and its grain supply', 1993.

¹⁹ Th. Brinkmann, quoted by Schlebecker, 'The world metropolis', 1960, pp. 193-194. See also: Chisholm, 'Rural settlement', 1979.

²⁰ Veldink, 'W.C.H. Staring 1808-1877', 1970.



Map 0.1. The division of the Netherlands in agricultural districts and in groups of agricultural districts as it was introduced in 1910-12.

A new basis for presenting the results of annual agricultural statistics. Basically, this division remained in use until well into the 1970's. After: 'Het grondgebruik', 1912.

- (1) marine clay districts with arable and mixed farming;
- (2) river clay (and loess loam) districts with mixed farming;
- (3) pasture districts (with livestock farming);
- (4) sandy districts with mixed farming (dairying, pig fattening and poultry keeping);
- (5) Veenkoloniën (or peat colonies); arable farming on sandy soils;
- (6) horticultural districts.²¹

²¹ In Dutch they were called: (1) *Zeeklei met akkerbouw en gemengd bedrijf*, (2) *Rivierklei met gemengd bedrijf*, (3) *Weidestroken*, (4) *Zandgronden*, (5) *Veenkoloniën*, (6) *Tuinbouwgebieden*.

Although in 1946 a proposal was made to introduce a new classification, the 1910-12 division remained in use practically unaltered until 1957. Then a new division was made defining 121 agricultural districts, ultimately combined in the same six main groups as the original division.

However, according to the 1910-12 system, each of the groups included districts which diverged to some extent from the main type, but were classified even so in the same group. An example of such a divergent region was the Zuid-Limburg loess district, which was classified together with the main group 'River clay districts with mixed farming'.

The group of 22 districts taken together as the 'Sandy districts with mixed farming' was the largest by far. This was not only so in terms of their total area – 47% of the territory of the Netherlands – but also according to the area of farming land that they contained. In 1910-12, this was as much as 37% of the total area of farming land in the Netherlands (which would increase further to 42% on the eve of World War II). The Marine clay districts and the Pasture districts both held 23%, the River clay districts (including the Zuid-Limburg loess district) 11% and the *Veenkoloniën* district (the former peat colonies) as well as the Horticultural districts both held 3% of the total area of farming land in the Netherlands which in total amounted to as much as 2,154,400 ha.²² In 1910, this area consisted for almost three fifths of grassland; as it did in 1950 incidentally (Figure 0.3).

Even though the new 1957 division was (largely) based on the same six main groups of agricultural district, the districts themselves changed quite a bit as their number was extended to as much as 121.²³ Finally in the 1970's a new division was introduced, more adequately adapted to the rapidly changing situation in Dutch agriculture. The new system was no longer based upon geographical criteria but had its main norm in the demand for labour on individual farms.

Yet, the geographical character of the division of 1910-12 still makes it highly attractive for our purposes, as it is based less on the ever changing styles of farming in time and uses more neutral terms than Staring's attempt from the 1860's does. It is for these reasons that we have chosen it as the regionalising framework of this book, especially as concerns the era before the 1950's.

The structure of the book

The scheme of the book is primarily of a chronological order – the warp: it is divided into four parts, each of them dealing with a very specific period in the long-term history of farming in the Netherlands. In so doing, the chronological set-up of the books is (at least partly) linked to the concept of the 'secular trend' as discussed above. Within these chapters, we will deal in principle with the subsequent, different types of agriculture according to the division in the agricultural districts as these were defined in 1910-12. So the latter is the geographical weft, that makes the fabric complete. However, concerning the first period that

²² The country itself held 32,600 km² at the time.

²³ Ministerie van Landbouw en Visserij. 'De nieuwe indeling van de landbouwgebieden', 1959.

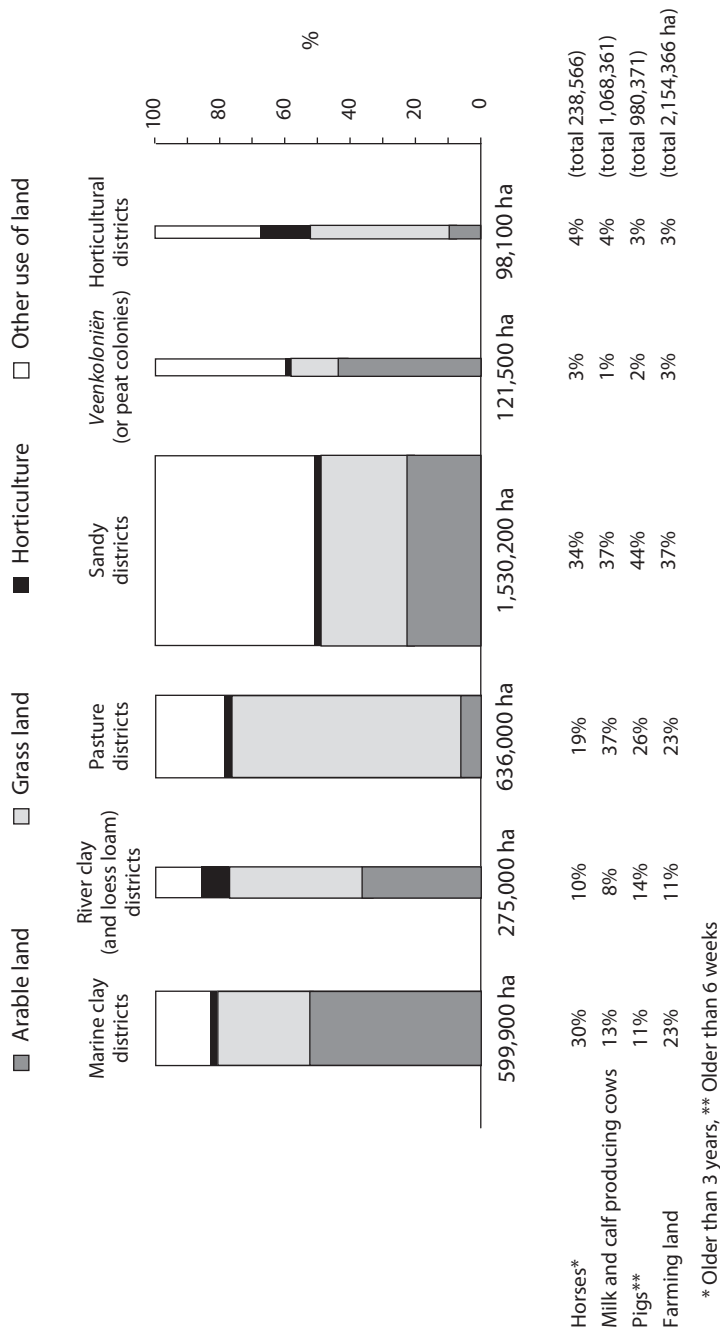


Figure 0.3. The (relative) size of the 6 groups of agricultural districts in the Netherlands, their area of farming land and the (relative) size of the livestock, in 1910-12.
Source: 'Het grondgebruik', 1912; 'Uitkomsten', 1912.

Introduction

is presented – i.e. the period 1500-1650 – the lack of more detailed information necessitated taking a broader scope. That is to say we will have to content ourselves with a bipartition between the coastal provinces versus the interior provinces. As far as the latter is concerned, we will only deal with the sandy regions.

Concerning the last period covered by this book, i.e. the period of five decades after 1950, developments in Dutch agriculture took on such a different character that we felt compelled to take a primary sector-like approach. Consequently, in this chapter we will discuss the arable farming sector, the livestock farming sector and the market gardening sector.



Map 0.2. General map of the Netherlands, indicating the names of the provinces, some important towns and some special regions.

Part 1 – The period 1500-1650
Expanding diversity

1.1. Introduction

At the end of the Middle Ages in the territory of the northern and southern Netherlands various population densities were found to belong to the highest, as well as to the lowest known in north-western Europe. In the light of this, four demographical zones can be perceived, forming more or less concentric strips from the most urbanised zone along the coast of the North Sea into the interior. Whatever criterion is used – degree of urbanisation, absolute number of people, or population density – a similar order emerges every time: in the centre, the most urbanised zone, the degree of urbanisation in Flanders and Walloon-Flanders already amounted to 36% in 1469.²⁴ More than one third of the total population in this zone lived in towns. In the area covering the current-day province of Zuid-Holland this share even rose as high as 54% in the early 16th century. In a second, encircling zone (containing the province of Brabant and the present-day province of Noord-Holland) the degree of urbanisation amounted to between 28 and 31%, followed by a third zone including, for example, the province of Friesland, where 21 to 25% of the population lived in towns. And finally there was the fourth, most peripheral zone, with a degree of urbanisation of less than 20%. But even here a relatively large number of people lived in towns, compared to the situation elsewhere in Europe. At that time, in most European countries the degree of urbanisation did not exceed 10-15%.²⁵

In the most urbanised zones, also the country side was the most densely populated; while this density decreased towards the periphery. The Flemish countryside contained as many as 45 persons per km² in 1469 and that in Holland even 47 persons per km². In the Brabant countryside there were about 27 persons per km² in 1573 and in Friesland in 1511 17 persons per km². In Gelderland, in the Veluwe district as well as in the area east of the river IJssel, as many as 10 persons per km² were counted and in Overijssel only 8.²⁶ In the province of Drenthe, population density in the 17th century was already below the numbers in Gelderland and Overijssel, and that must have been even more so in the early 16th century.²⁷

In what has become known as the 'long 16th century' the population of north-western Europe increased in unprecedented fashion, from little more than 60 million to about 75 million.²⁸ Also, in the region covering the present kingdom of the Netherlands, population numbers grew rather markedly. The period after 1580 was particularly dynamic in this respect. At the beginning of the 16th century Dutch population totalled about 1 million people. Around 1600 this had increased to as much as 1.5 million and then to about 1.9 million in 1650. So, within the space of one and a half centuries the number of 'Dutch' had almost doubled.²⁹ In the coastal provinces in particular the increase was exceptionally

²⁴ Blockmans *et al.*, 'Tussen crisis en welvaart', 1980, pp. 42-51.

²⁵ De Vries, 'European urbanization', 1984.

²⁶ Blockmans *et al.*, 'Tussen crisis en welvaart', 1980, pp. 42-51.

²⁷ Bieleman, 'Boeren op het Drentse zand', 1987, pp. 57ff; Van Schaik, 'Belastingen', 1987, pp. 289-290, (Table 38).

²⁸ De Vries, 'European urbanization', 1984.

²⁹ Faber *et al.*, 'Population changes', 1965; Schuurman, 'Historische demografie', 1991.

high. In the former county of Holland (the present-day provinces of Noord- and Zuid-Holland combined) and Friesland the number of inhabitants grew from about 350,000 in the early 16th century to about 1 million in 1650. Initially, this growth occurred in particular in the country. Strikingly, however, after 1570-80 an explosive increase in the urban population came about. After that, the number of towns in Holland (with at least 2,500 urbanites) increased from 17 in 1525 to 23 in 1675. Leiden and Amsterdam, both true ‘boom towns’, grew from small towns each with about 15,000 inhabitants in the early 16th century to cities with respectively 65,000 and more than 200,000 one and a half centuries later. Subsequently the next biggest were Rotterdam with about 45,000, Haarlem with 37,000, Middelburg (Zeeland) with 27,000 and Utrecht with more than 25,000 urbanites. In the inland provinces population increase was much more moderate than in the coastal provinces. Overijssel, for instance, had as many as 53,000 inhabitants in 1475 and in 1675 this number had increased by ‘only’ 18,000 to 71,000 in 1675.³⁰ Yet, it is important to realise when viewing these figures that the interior country in particular had suffered badly from warfare during the years of the Revolt (1568-1648); the same – or even worse – applied to the southern parts of the country.³¹



As the European population grew the demand for agricultural products increased, which meant more grain, more meat and more wool, was needed to feed and clothe all these new Europeans.³² All this went along with a remarkable rise in prices, above all for grains. However, while grain prices increased much faster than those of livestock products throughout Europe, here in Holland the opposite was true. Grain prices not only rose less fast than elsewhere, they also lagged behind on those of animal products, like butter.

While the price of rye had risen more than five-fold in the period between 1500 and the first half of the 17th century, the price of butter had gone up more than seven-fold (Table 1.1). This conspicuous evolution strongly determined the economic situation in which Dutch agriculture developed in this important stage of the ‘secular trend’.

The diverging development of livestock product prices against those of arable products, here, in comparison with the general European trend, was not only caused by the relative high standard of living in the Netherlands. It was caused just as much – or maybe even more – by increasing imports of grain from the Baltic in that period. This flow of grain had increased from less than 3,000 *last* (1 *last* \approx 30.1 hectolitre) in 1460 to 10,000 *last* around 1500 and then to more than 50,000 *last* during the first half of the 17th century.³³ It made Amsterdam the centre of the world grain trade at that time. Contemporaries – although not entirely unprejudiced – even called it the *moedernegotie* (mother of all trades), referring to

³⁰ Van der Woude, ‘Demografische ontwikkelingen’, 1980; *idem*, ‘La ville Néerlandaise’, 1983, pp. 307ff; De Vries, ‘The Dutch rural economy’, 1974, pp. 84ff; Schuurman, ‘Historische demografie’, 1991.

³¹ Faber *et al.*, p. 74, Table 3.1 and pp. 104-105; compare also: Daelemans, ‘Pachten en welvaart’, 1986.

³² Abel, ‘Stufen der Ernährung’, 1981, pp. 33-39.

³³ Faber, ‘Het probleem’, 1963; Faber, ‘The decline’, 1988; Tielhof, ‘De Hollandse graanhandel’, 1995.

Table 1.1. *The index of the prices of rye and butter in Utrecht and of beef in Leiden, in the period 1500-1649¹.*

	Rye (Utrecht)	Butter (Utrecht)	Beef (Leiden)
1500-24	100	100	100
1525-49	148	130	150
1550-74	230	231	250
1575-99	365	397	450
1600-24	409	554	500
1624-49	570	743	750

Source: Faber, 'De Noordelijke Nederlanden', 1980, p. 199.

¹ Index: 1500-24 = 100

its significance as the basis of the welfare of the city.³⁴ The dimensions of this trade caused the prices on the Amsterdam corn exchange to be a guideline for the price levels elsewhere in Europe. Although much of it was exported, large quantities were consumed here in the form of bread and beer and it is estimated that it was able to provide a major part of what was needed in the Netherlands. As such it must also have had an oppressive effect on the general price of grains compared to that in other countries. Naturally, this had a significant impact on developments in Dutch agriculture.

As the urbanised economy of coastal districts – in particular of the provinces of Zeeland and Holland – developed, the centre of gravity of the north-western European (agro-) economy shunted from Flanders to the northern Netherlands. As this happened it induced a force field which – in its spatial dimensions – showed a striking similarity with the set-up of the classic allocation model of Von Thünen, known as the 'Isolated state', ranging from the Baltic to the Mediterranean. In the midst of this towns-land many highly commercial and specialised, modern farming systems emerged: very modern types of dairy farming and different types of horticulture were battling for space. To the extent that it concerned arable farming, farmers focussed on the cultivation of all sorts of special (non-food) crops, besides – of course – cereals like wheat and barley. Some distance away from the economic centre of gravity grain cropping became more prominent. Within the context of the Thünensian field of force, farming in the different regions of inland provinces also developed, perfectly adapted to the specific regional conditions on the spot.

Spectacular developments in farming were closely interwoven with the emergence of sophisticated trade and traffic networks, being of a mutual and decisive significance to each other. The 16th and 17th century farmers availed of an extensive network of specialists to sell and transport their products. Arable farmers in the Zeeland islands and in the Beijerlanden (Zuid-Holland) could entrust their products to a market bargeman, who transported these

³⁴ Faber, 'Het probleem', 1963.



Illustration 1.1. The harvesting of the wheat crop in the province of Zeeland (near the town of Goes) around the middle of the 17th century.

The land labourers are using sickles to cut the stalks. Notice the length of the stubbles that are left behind.
Source: Zeeuws Genootschap, 'Zelandia Illustrata'.

to the markets of Dordrecht, Rotterdam or other, smaller regional ones. These bargemen settled the actual transactions and took care of the remaining financial business dealings (Box 1.1).³⁵

In Friesland too, a dense and sophisticated network of transport on waterways ensured that farmers were able to dispose easily of their products, whether these were intended for local or regional customers or somewhere further away.³⁶ Owing to the summer fattening business of oxen in Noord-Holland, we are familiar with similar and far-reaching trading systems. These people, Amsterdam merchants, obtained their animals from Northern Germany and Denmark and had a sophisticated network of trade relations at their disposal.³⁷ Other Amsterdam merchants managed to persuade landlords and farmers in the sandy Veluwe district to begin to cultivate tobacco. They processed the dried tobacco leaves and for this purpose special joint ventured agreements were set up between the parties involved.³⁸ It was another fine example of the interdependence between the rural economy of these sandy regions and the urban-based manufacturing and trade sector.

³⁵ Baars, 'De geschiedenis', 1973, p. 179; Van Cruyningen, 'Behoudend maar buigzaam', 2000, pp. 207ff.

³⁶ Faber, 'Drie eeuwen Friesland', 1972, p. 292.

³⁷ Recently studied in detail by Gijsbers, *Kapitale ossen*, 1999; *idem*, *Danish oxen in Dutch meadows*, 1993.

³⁸ Roessingh, 'Inlandse tabak', 1976; *idem*, 'Tobacco growing in Holland', 1978.

Box 1.1. Farmer and market in Zeeuws-Vlaanderen (Zeelandic Flanders) in the 17th century.

How did a farmer in the marine clay district of the southwesternmost part of the Zeeland delta maintain his contacts with 'the market'. Usually, he was the one to decide where and when he wanted to sell his produce. Immediately after the harvest the threshing of the grain began, a job that took up virtually all the time until the next harvest, as this was all done by hand. Once threshed, the grain was stored up in the grain loft, above the dwelling quarters of the farm or the cart shed. As soon as the farmer expected to make a good price for it, the grain was taken to the nearest port in small batches and loaded on to the *poonschuit*, a ship used by the market bargeman. He was the one to transport the grain to a destination given by the farmer: the town and the agent the farmer normally conducted business with. Once there, the grain was unloaded under the supervision of the agent and stored. The agent (the *pondgaarder*) was a broker who sold the grain on the local stock market under the orders of the farmer and received a certain brokerage fee (usually 1.5% of the selling price). After he had sold the grain, he handed over the selling price minus the cost of transport, storage and, of course, his fee to the bargeman. To avoid irregularities, the accounts and the money were sealed in a bag marked with the initials of the farmer and handed over to the latter once the bargeman was back home.

(Source: Van Cruyningen, 'Behoudend maar buigzaam', 2000).

Furthermore, developments like this strongly influenced the rural economy in different parts of the country. Especially – again – in the coastal regions we can observe that the rural population was ever more focussed on strictly agricultural activities, disposing of all kinds of non-agricultural ones. In doing so, a basis for existence gradually developed for an ever-growing group of artisans and people involved in the trade and traffic business. Around the middle of the 17th century it had led to the existence of a highly differentiated rural economy. In Friesland, for example, in 1511 at least 70% of the Friesian population was still involved in agriculture. Around the middle of the 18th century, however, this share had gone down to only 44% and around 1650, this figure may presumably have been even lower yet.³⁹ The latter is analogous with the situation in Holland where the decline was even more manifest. In the northern part of Noord-Holland, the Noorderkwartier, only 29% of the adult, male working force was still involved in agriculture around the middle of the 19th century. And it is estimated that around 1650 this figure had been no higher than only 20%.⁴⁰

³⁹ Faber, 'Drie Eeuwen Friesland', 1972, pp. 99ff., p. 123 and pp. 440-441 Table 3.2.

⁴⁰ Van der Woude, 'Het Noorderkwartier', 1972, pp. 273 and 277. It is true that this figure does not include day labourers, but as far as they were there, they were not involved in the agricultural sector, according to Van der Woude.

Situations like the one described above in the coastal regions formed a stark contrast with the situation in the interior, for instance, in the north-eastern sandy regions, and Drenthe in particular. A low labour input type of farming which prevailed in this province went along with a rural population that in socio-economic terms was still barely differentiated. There was still a lack of basis for existence for a group of artisans and shopkeepers. In fact, practically seen, the only ‘specialists’ were millers and blacksmiths.⁴¹ Here, the situation was similar to the more general one in Europe, where the share of the rural population trying to make their living in farming usually still exceeded 80%. Farming here was still very much a means of survival. Once again, it explains how exceptional the situation was in the rural economy of the coastal regions.

Yet it would be wrong to express the developments farming underwent in this period only in terms of growth and prosperity. The situation during the second half of the 16th and the first half of the 17th century in particular was marked by the effects of the military operations during the Revolt. The inland provinces suffered particularly badly, being an almost constant battle scene after 1580. Although, undoubtedly, the Southern regions suffered most the Eastern parts of the country (the Achterhoek, Twente, Salland and Drenthe) were also ravaged continuously. Passing infantry and horsemen, not paying for what they consumed, ransacked the land, according to the principle *le pays nourrit le soldat*. Discharged and deserting soldiers went through the country in bands of brigands and trussed and took hostage the rural population. Farmers were robbed of their livestock and stores, crops were plundered and trampled; fields remained uncultivated for years. For instance, in 1623 after the Duke of Brunswick, who had been fighting with his troops on the side of the allied provinces, had roamed through the eastern parts of the country on his way to Ostfriesland (north-western Germany), not a single grain of corn was to be found in the villages he entered on his way.⁴²

In Twente, in the early 17th century almost one fifth of all the farms were abandoned and the arable left uncultivated; in Drenthe – in the Southwest in particular – the situation was similarly bad.⁴³ Also in the coastal regions where large areas of land had been inundated and as towns were besieged, it was the rural population and thus the farmers who had to pay the price. However, after the return of the normal situation, the rural economy recuperated with a remarkable resilience and the process of economic expansion that had begun before the outbreak of the hostilities, continued.

For a long time the Dutch Golden Age has been viewed as if it was the hey-day of trade, industries and arts only. Yet it has become clear that the remarkable transition the agricultural sector went through must have been a strong force behind the economic success of the young Republic.

⁴¹ Bieleman, ‘Boeren op het Drentse zand’, 1987, pp. 97-154.

⁴² Heringa, ‘Zelfstandig gewest’, 1985, p. 385; see reference to: 1622*; also: Daelemans, ‘Pachten en welvaart’, 1986.

⁴³ Slicher van Bath, ‘Een samenleving onder spanning’, 1957, pp. 430ff.; Bieleman, ‘Boeren op het Drentse zand’, 1987, pp. 60-61 and 205-208.

1.2. Farming in the coastal provinces

Towards the end of the Middle Ages the physical situation on the coastlands of the northern Netherlands looked very unpromising. Over time, in the northern parts of Groningen, increasing storm tide activities had caused a large area of land to disappear into the sea. The breaching of the Dollard embayment in 1287 and the subsequent further loss of land in this area is the most well-known case; in 1509 this marine basin was extended to its maximum. Yet, the extensive, well drained, tidal levee lands along the coast with their artificial dwelling mounds remained a sustainable populated area from which the inhabitants continually tried to expand their area of cultivated land. From 1545 onwards the reclaiming from the sea of the land that had been lost previously began again. Before, during the years 1505-06 the mouth of the old Middelzee, which had long divided Friesland in two, was closed to reclaim the Oude Bildt-polder from the sea.

Also in the south-western delta region large parts of the original clay-on-peat landscape had perished. Complete regions disappeared temporarily or permanently from the maps, like the populous *Grote* or *Zuid-Hollandse Waard* in 1421. After that only some islands remained as kernels of 'old land'. From these kernels, however, there was a fresh attempt to dike in the newly washed up deposits to turn them into new polder-land, although with varying success. For instance, between 1350 and 1450 the Zuid-Beveland island was extended by c. 5,500 ha of new polders, of which much was lost again in 1530-32. Around the middle of the 17th century much of the land in the Zeelandic Flanders district most of which had disappeared in an earlier period, had been reclaimed again and turned into good farming land.⁴⁴ Taking the whole province of Zeeland, the area of diked land increased by 49%, from 85,000 ha to 127,000 ha between 1600 and 1680.⁴⁵ The diking in Oud-Beijerland in 1557 and Nieuw-Beijerland in 1582 resulted in 2,300 ha of reclaimed land. The common feature of all these new marine clay polders – or *nieuwland* – was their flat-lying position and their uniform soil profile.

As a matter of fact, from a pedological point of view the category of marine clay districts is far from homogeneous. Besides the younger polder soils, it consists of very different soil types. In the northern marine clay district in Groningen, for instance, seen from the coast going into the interior there is a very characteristic sequence of soil types. At first the relatively high, old *kwelder*-levees, with their sandy topsoil; subsequently the heavy clay pan soils which in fact are only suitable for use as grassland. Further into the country these soils change into clay-on-peat soils and then into peat soils. In Zeeland, the higher, creek-ridge soils are in a way the counterpart of the Groningen *kwelder*-levees.

Between both the marine clay regions, clamped between the Old Dunes or *strandwallen* (beach bars) on the one hand and the Pleistocene hinterland on the other, the large Utrecht/Holland peat bog stretched out and in fact continued into Friesland. This peat wilderness,

⁴⁴ Compare: Van Cruyningen, 'Behoudend maar buigzaam', 2000, pp. 17-24.

⁴⁵ From then on, the area of diked land would even fall back slightly, only to increase again significantly after 1770. Priester, 'Geschiedenis van de Zeeuwse landbouw', 1998, pp. 31-37, annex B.1.

consisting of a series of large peat cushions – up to 5 metres thick at their centres – was explored and occupied in the period 1000-1350, when the characteristic *cope* settlements with their strip parcellation were established. These settlements were measured out, according to a predetermined plan and in very systematic design. A commonly occurring width of strip or *stroken* in the early stages was 30 *roeden* or 110 to 115 meters. And in many cases the length of the strips was settled at 6 *voorlingen* or 1,250 to 1,300 meters or double, 12 *voorlingen*; in other cases the length of the strips was not fixed formally. In principal this type of settling produced a very egalitarian farm size structure: farms would hold about 10.5 to 15 ha or 21 to 30 ha.⁴⁶

Recently, it has been established that the ground level in these *cope* settlements – just as in the peat areas of Friesland and Groningen – has sunk by more than two metres or even more, ever since these peat bogs were occupied during the High Middle Ages about a thousand years ago. For the eastern parts of the West-Friesland region (part of the province of Holland) it is reckoned that around the middle of the 14th century the ground level of the peat must even have been more than 3½ metres higher than it is today.⁴⁷ This surface lowering was caused by a process of bedding down of the peat pack induced by its drainage in conjunction with a process of oxidation causing the peat to simply vanish. Just a subsequent, successive lowering of the water level could improve the situation, of course, but this would eventually lead to a further and irreversible lowering of the surface. In addition to this lowering of the surface, the digging of peat (to be used as fuel) was also an increasing threat to the peat land, becoming even more serious when the method of peat dredging was introduced around 1530, causing the resulting lakes to become larger.⁴⁸

As a consequence the Noorderkwartier district, i.e. the old county of Holland north of the IJ-water had become such a watery peninsula, that it had in fact become a mere archipelago of islands by the beginning of the 16th century. Storms, accompanied by floods were subsequently a constant danger to the remaining parts of land. For purely defensive reasons, a large number of smaller lakes and bigger lakes were pumped dry and reclaimed, after the early 16th century. After that, stimulated by rising land prices and the increasing profitability of agriculture, with the reclaiming of the Beemster lake in 1612, a true boom in big, spectacular projects began. Within a period of 25 years, the Purmer (1622), the Wijde Wormer (1626), the Heerhugowaard (1630) and the Schermer (1635) followed (Box 1.2). Furthermore, a number of polders were reclaimed from the washed-up lands along the coast (*aandijkingen*): de Zijpe (1597), the Callantsoog polder, and the Wieringerwaard (1617). Just the first five above-mentioned *droogmakerijen* alone, allowed more than 1,400 new holdings to be established, with an average size of 15-30 *morgen* (= 13-26 ha).⁴⁹

Yet, from winter to spring it was common for large parts of the country in Holland to be flooded by rainwater, as it could not be let out. In March 1637, for instance, lands in

⁴⁶ Van der Linden, 'Het platteland', 1982, pp. 64ff; Henderikx, 'Die mittelalterliche Kultivierung', 1989.

⁴⁷ Beenakker, 'Agrarische veenlandschappen', 1986, pp. 39ff.

⁴⁸ Borger, 'Agrarisch veenlandschap', 2000; Kaijser, 'Preparing the ground', 1999, pp. 37-56

⁴⁹ De Vries, 'Landbouw in de noordelijke Nederlanden', p. 33.

Box 1.2. About polders, droogmakerijen and aandijkingen.

There are few concepts more typically Dutch than the *polder*. And yet the meaning of the word is far from unambiguous, as *droogmakerijen* and *aandijkingen* are also *polders*. *Polder* is in fact the most general concept. A *polder* is a hydraulic unit. It is any area of land enclosed by dikes that lies lower than the surrounding water and of which the water level is regulated artificially, by means of outlet sluices, windmills or mechanical pumping stations. For this purpose a *polder* is usually criss-crossed with canals and ditches. It is reckoned that about 70% of the area of the present-day Netherlands is *polder*-land.

One important type of *polder* is that which came about after a certain area of peat land was reclaimed once the peat had been cut away, leaving the former land as a (shallow) lake. These *polders* are the result of a process of *vervening*, that is to say peat digging. A major example of this type of *polder* is the Zuidplaspolder, north of Rotterdam, in the province of Zuid-Holland which fell dry in 1840 and is 4,100 ha. (This *polder* contains the lowest point of the Netherlands: 6.76 m below average sea level).

A rather special type of *polder* is the *droogmakerij*. *Droogmakerijen* are *polders* that were reclaimed from a (natural) lake. The first ones came about during the second half of the 16th century. Most famous, however, are the projects that were accomplished during the first half of the 17th century, during what is known as the 'Dutch Golden Age'. The five largest are: the Beemster (1612; 7,100 ha), the Purmer (1622; 2,756 ha), the Wijde Wormer (1626; 1,620 ha), the Heerhugowaard (1630; 3,500 ha) and the Schermer (1635; 4,770 ha) in the province of Noord-Holland; together these *droogmakerijen* created almost 20,000 ha of 'new land'.

In the course of the 19th century, as technology evolved, engineers were able to accomplish ever bigger projects. The biggest inland lake then, the Haarlemmermeer, was diked and pumped dry with the help of steam-driven pumping stations in 1852 and covers 18,100 ha. The *polders* that were accomplished in the 20th century within the framework of the extensive Zuiderzee project are also in fact *droogmakerijen*. The first one was the Wieringermeer (1930; 20,000 ha). Then came the Noordoostpolder (1942; 48,000 ha) and finally Oostelijk Flevoland (1957; 54,000 ha) and Zuidelijk Flevoland (1968; 43,000 ha); together they make 165,000 ha.

Aandijkingen are another form of 'new land'. The younger marine clay *polders* in the south-western delta region, for instance, are all considered to be *aandijkingen*. They came about when washed-up mud flats (in the south-western delta called *schorren*; their northern equivalents are called *kwelders*) were diked following the Late Middle Ages after much of the former peat land had vanished due to the effects of storm surges and peat digging in the preceding centuries. In the province of Zeeland the net area of *polder* land reclaimed this way between 1600 and 1910 amounted to as much as 76,500 ha; about half of the present-day province. Most of it was reclaimed during the first half of the 17th century.

(Source: Schultz, 'Waterbeheersing van de Nederlandse droogmakerijen', 1992; Priester, 'Geschiedenis van de Zeeuwse landbouw', 1998, p. 31ff).

the Schermer-polder were so badly flooded that all sown crops were lost.⁵⁰ Soon, it also became clear that the initial aim of turning the *droogmakerijen* into wealthy arable lands to cultivate profitable oil seed crops like rapeseed and coleseed had to be abandoned. Initially, this prospect had been an important incentive for investors to give large sums of money for these enterprises.⁵¹ The state of water management technology at that time meant that it was impossible to hold on to this objective. The share of grassland soon increased as tenants in the *droogmakerijen* were forced to shift to livestock farming.

Despite a very unfavourable physico-geographical basis, large parts of the coastal provinces were transformed into a completely new land in just a short period of time. There are a number of reasons why it did not turn out the other way around as in many other parts of Europe.

At first there was, what has been called by some historians, the ‘Medieval inheritance’, i.e. the modern structure that the society of the coastal area of the present-day Netherlands already had during the Late Middle Ages, and which was very different from situations elsewhere in Europe. Historians referred to the characteristic, juridical and social framework, consisting of weak seigniorial rights, a powerful united, free peasantry, and the autonomy and great powers of the polder-boards (*beemraadschappen*). This was a direct consequence of the way the area had been occupied during the Late Middle Ages, without feudal structures being able to develop. Even if there had been initiatives to make such structures, these soon deteriorated.

Then there was the favourable transport-geographical situation, due to the many waterways that criss-crossed the country, coupled of course to the vicinity of the highly urbanised economy in Flanders which had emerged during the high Middle Ages. The latter not only formed an important sales market for ‘luxury’ livestock products, like butter, cheese and meat. The Flemish cities and their industries also offered a sizeable market for a number of special, non-food crops that arable farmers here could produce. The latter could seriously dedicate themselves to the cultivation of these special crops since the provision of grain came from outside: from the Late Middle Ages onwards an increasing quantity of grain was imported into Amsterdam from the Baltic.

Arable (and mixed) farming on the marine clay soils

In the northern marine clay district, in particular in Friesland, changes in farming in this period were dominated first and foremost by a shift in the area under grass to the area of arable land.⁵² From the 16th century onwards a continual extension of the area of land ‘under the plough’ increased, a clear symptom of a process of arablization. Some authors

⁵⁰ Van der Woude, ‘Het Noorderkwartier’, 1972, p. 56.

⁵¹ Indeed, the first year that the Beemster-polder was dry, the yields were so abundant that – according to a report from Leeghwater, the famous hydraulic engineer – all oil mills in Holland had enough work for a whole year. Bouman, ‘Bedijking, opkomst en bloei’, 1857, pp. 140-145; De Vries, ‘The Dutch rural economy’, 1974, p. 153 and note 96 (p. 269).

⁵² Faber, ‘Drie eeuwen Friesland’, 1972, pp. 191ff.

even claim that the farmers' eagerness to plough up grasslands was so great that landlords and authorities tried to curb it.⁵³

Yet, the division of farming land between arable and grass lands was less rigid than one is accustomed to believe. The available historical sources seem to indicate that in the course of the late 16th and 17th century a system of ley farming spread. Under this system, certain parts of farmland after having been used as arable land were shifted to temporary grassland and vice versa, to the benefit of the crop yields.

Many mid-17th century lease contracts from the Groningen marine-clay region contain a general clause stating that tenants were free to use their farmland at their own discretion 'to plough, to make hay or to pasture'.⁵⁴ In order to turn certain parts of their arable into grass, farmers used a mixture of hayloft sweepings and white-clover seed.⁵⁵ This white-clover must have been an important factor in improving the productivity of the grassland. From lease contracts like these, it can also be deduced that at the same time and for the same reason, more labour was invested in the draining of grassland. Stimulated to increase their production, farmers not only paid more attention to their farmland by improving drainage, they began to manure their land more heavily as well. The Friesian gentleman-farmer Rienk Hemmema, who very conscientiously kept an accounting diary in the years 1569-73 noted that he bought large quantities of night soil from the nearby town of Franeker. He also began to build dung channels in his cow house, in order to produce manure more efficiently.⁵⁶ Again, in a chronicle written by an anonymous farmer from Groningen around 1590, there is a mention of increasing interest on the part of farmers to prepare manure. Previously they had used their manure (after drying it) for fuel, or even to fill hollows and ditches in their lands or to level roads: 'because they did not know where to leave it'.⁵⁷ In 1610, the States of Friesland went so far as to forbid the use of (dried) manure as fuel or to export it in favour of using it to improve their lands.⁵⁸

As the process of arablization continued, the need for draught power increased. This is reflected in data from probate inventories from parts of the Leeuwarderadeel district in the north of Friesland, where the average number of horses and colts rose from 2.4 per farm in the years 1566-74 to 4.2 in 1677-86.⁵⁹

Initially barley had been the dominant crop. However, during the late 16th and 17th centuries this crop gradually lost its importance, as wheat (*Triticum aestivum*) in particular became increasingly prominent.⁶⁰ Other winners were rye, beans and coleseed. Pulses (peas and beans) were particularly important because of their ability to fix nitrogen. The

⁵³ De Boer, 'De Friesche kleiboer', 1897/98, p. 235.

⁵⁴ Hoppenbrouwers, 'Grondgebruik en agrarische bedrijfsstructuur', 1991, p. 98.

⁵⁵ Slicher van Bath, 'Een Fries landbouwbedrijf', 1958, p. 99; *idem*, 'De agrarische geschiedenis', 1960, pp. 198ff and 268ff; Bergsma en Waterbolk, 'Kroniekje', 1986, pp. 35-36.

⁵⁶ Slicher van Bath, 'Een Fries landbouwbedrijf', 1958, pp. 89 and 159.

⁵⁷ ... 'dat sij anders niet wisten, waer sij de solden laten'. Bergsma en Waterbolk, 'Kroniekje', 1986, pp. 35-36.

⁵⁸ De Boer, 'De Friesche kleiboer', 1897/98, p. 406.

⁵⁹ De Vries, 'The Dutch rural economy', 1974, pp. 137-140, Table 4.10.

⁶⁰ *Ibidem*, p. 148, Table 4.11.

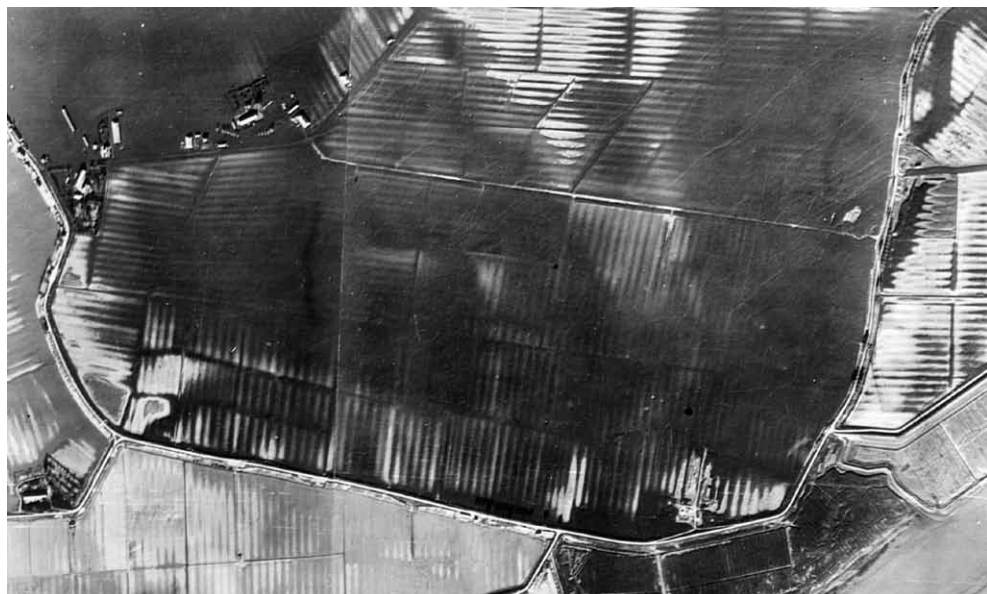


Illustration 1.2. Relics of a ridge and furrow draining system in south-western Netherlands.

Before earthenware draining pipes were introduced in the 1860's, everywhere in the clay arable regions farmers drained their arable land with the help of an 'open drainage' system. The arable was subdivided lengthwise into strips (akkers), each with a width of 10 to 20 meters. The akkers were separated by shallow ditches. The difference in height between these akkers and ditches lay in the order of some decimetres. This aerial photo of the inundated southern part of the Galathee Polder in the island of Goeree-Overflakkee (diked in 1524) was taken by the allied air force on 18th March 1945. The relics are recognizable from the elongated strips (the still partly dry akkers) amidst the dark parts (the wet swampy ditches). Source: Private collection of author.

increased importance of wheat suggests that farmers reorganised their crop mix to increase the proportion of their output sold on the market. From Hemmema's diary we know that he managed to sell as much as 92% of the wheat he produced. At the same time he bought rye to consume in his own household. Of his barley he sold almost two thirds; the rest was probably used as fodder for his cattle or to make gruel or beer.⁶¹ It seems that around the mid-17th century coleseed or oilseed rape (*Brassica napus*) was the prominent oil seed, having ousted rapeseed (*Brassica rapa*) in the foregoing period. Together, these crops must have covered 5% or even more of the arable in Friesland. For the time being, however, both would remain the only non-food crops of some importance in the northern marine-clay region.



⁶¹ Slicher van Bath, 'Een Fries landbouwbedrijf', 1958, pp. 97-98.

In the south-western marine clay region, arable farmers had in fact been farming a stone's throw away from the highly urbanised economy of the Flanders, which had emerged after the High Middle Ages. Since then, they had benefited from an increasing demand for all kinds of special (non-food) crops from the Flemish cities. And although wheat cropping was undoubtedly dominating the overall picture, the current farming system in the delta region in this period stands out because of its striking variety of crops. Flax (*Linum usitatissimum*), for instance, was counted as one of the main crops of the region. And beside other cereals like barley and oats, there were also coleseed, onions, herb crops like coriander, horse radish, teasel; the flower head of the latter plant was used in the weaving industry to comb the cloth after it had been woven.

However, no other crop has been so closely associated with arable farming in the south-western region as madder (*Rubia tinctorum*). Madder (*meekrap* or *krap*) was a root crop, which was processed into powder to be used as (red) dye stuff in the textile industries. Its cultivation was known for being very specific and laborious before the roots of the crop could be dug up (*delven*) in the second or third year of its growth.

It is believed that madder cultivation experienced its first boom in the 13th and 14th century.⁶² In the early 14th century, in the nearby polders in adjacent Flanders between Ghent and Bruges as much as 15% of the total arable was sometimes planted with the crop.⁶³ The expansion of the madder culture to the marine clay parts of Western Brabant dates from some time later on, namely the first half of the 15th century. By then large quantities of madder were already being exported to the southern and eastern ports of England too, to be used in the cloth industries over there. The Italian diplomat Guicciardini wrote in 1567 that the cultivation of madder in Zeeland was so important that this region could supply the whole of Europe with it.⁶⁴ And although the expanding cloth industry in Leiden and other Dutch towns after 1580 must have stimulated its cultivation, it is believed that England was to remain the most important customer.

From about the 1580's to the middle of the 17th century, the area under madder on the island of Schouwen, which became known as the centre of gravity of the madder culture, increased from less than 10% to 20-25% of the total arable. After the roots had been harvested, they were dried and processed into powder in *meestoven* or madder kilns. These kilns were usually owned by a partnership of about six shareholders, mostly farmers. At the end of the 17th century, the whole of the south-western delta region must have counted a total of about 50 madder kilns.⁶⁵

A striking element of the expanding economy during the 'long 16th century' – the sophistication of commercial capitalism and the way the agricultural sector became interwoven with it – was the emergence of a permanent staple market for madder in the

⁶² Boerendonk, 'Historische studie', 1935, pp. 90ff.; Wiskerke, 'De geschiedenis van het meekrapbedrijf', 1952; Van der Poel, 'De teelt van meekrap', 1964; Priester, 'De geschiedenis van de Zeeuwse landbouw', 1998, pp. 323-374.

⁶³ Verhulst, 'Precis d'histoire rurale', 1990, p. 119.

⁶⁴ Guicciardini, 'Beschryvinghe', 1612 (1968), p.166.

⁶⁵ Priester, 'De geschiedenis van de Zeeuwse landbouw', 1998, pp. 353ff.

Part 1 – The period 1500-1650

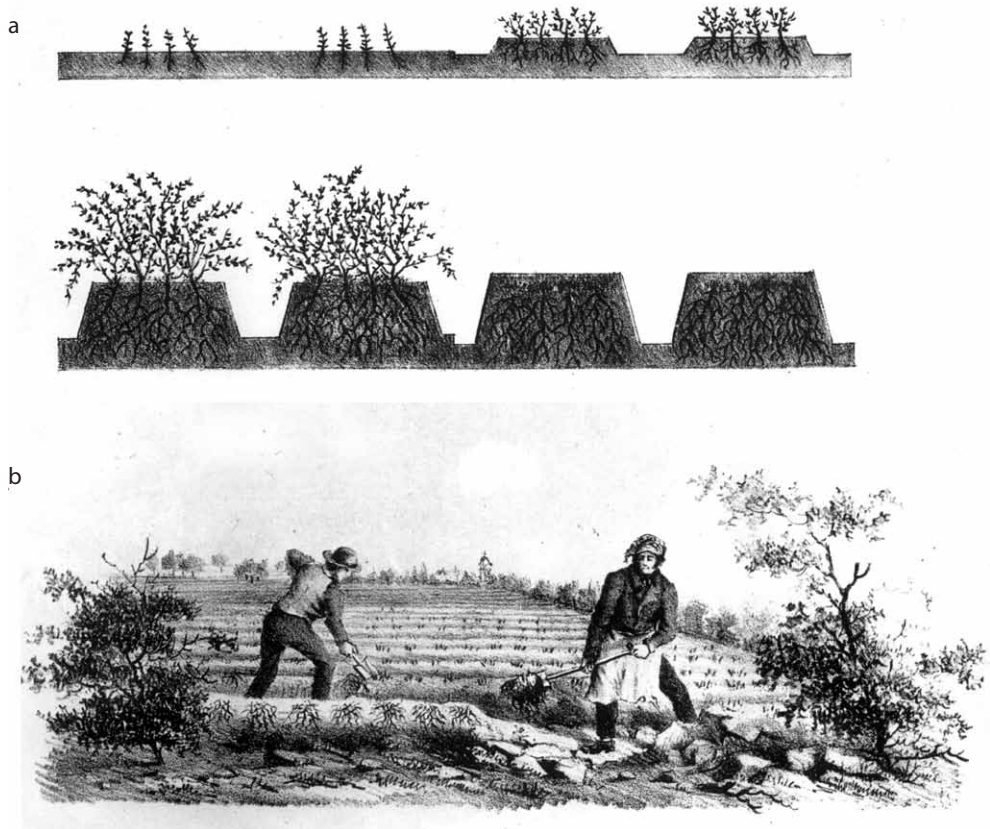


Illustration 1.3. The cultivation of madder in the south-western marine clay district.

(a) After the plating out of the cuttings (kiemen) the plants were earthed up several times; the last time with the help of a special type of ridging plough. After the tops had died back in the autumn, the roots were covered with a layer of soil. After that, in the spring, the plants sprouted again. The bottom picture (b) shows the digging up of the roots of the two or three year old madder plants. Before the tops had been cut off. Source: Verplancke, 'Beschrijving der werkdadige landbouw-konst', 1830.

city of Rotterdam. As this market developed, it gradually absorbed the supply which had previously gone to smaller regional markets in towns like Middelburg, Veere, Zierikzee, Dordrecht and Antwerp. As such the Rotterdam staple market became an important complement to the primary production of madder by the farmers. Until then it had often been difficult for the farmers who owned madder kilns to find a proper buyer for their relatively small lots of various qualities they produced. The madder traders – on the other hand – were able to set up a large diversity of stores of different qualities and were therefore able to satisfy any demand at any time.

Due to all the tillage involved in the growing of crops like madder and the additional care Zeeland farmers took with their arable lands, the latter were notoriously and exceptionally

weed-clean. Because of this, productivity of all crops was very high. At the end of the 16th century wheat yields, for instance, had already reached a level that would only be improved significantly again in the second half of the 19th century. Recently, it has been established that in between, for a period of more than one and a half centuries, the crop yields varied from a minimum of 15 to a maximum of 25 hl/ha, or approx. 1,150 to 1,900 kg/ha.⁶⁶

Livestock farming

The broad area of peat soils and clay-on-peat soils stretching from the south-western delta marine clay region in the north, bordering the Pleistocene sands in the east and south, has the reputation of being the first and foremost livestock farming region in the Netherlands. Yet, during the High Middle Ages, after the peat-wilderness had been occupied, arable farming must still have been possible on top of the drained bog. Gradually, however, because of the drainage of the peat and cultivation, a process of bedding down of the peat layer began and, consequently, the ground level began to sink. For that reason, the cultivation of winter sown crops had to be given up in the Late Middle Ages, although spring sown crops like barley and oats remained important for some time. For oats, in particular, the blooming brewery industries in the towns⁶⁷ remained an important sales potential for some time.

In time, however, the process of subsidies forced farmers to shift from arable farming to livestock farming. Yet, sources like the *Enquete* and *Informacie* – both inquiries to inform the ruler about the economic situation in the former county of Holland and composed by about 1500 – show that until that point livestock farming did not have the allure that would later on be so legendary. In Holland, most stocks usually held no more than 10 or 12 head of cattle. Just a few farmers had more than that. Holdings like the one of Jan Gorryssoon from the village of Vrijenban (near Delft) which had 20 to 23 head of cattle, were the exception to the rule. The average stock totalled about 4 to 6 head of cattle. Around the town of Hoorn, for instance, one third of all cattle keepers had just 1 or 2 animals, with the average being less than 5 head of cattle.⁶⁸

Even so, in the 15th century significant quantities of butter and cheese were already being exported from Holland to the German hinterland. Butter and cheese was also shipped in great quantities to England, France and Spain. In addition, the towns in the southern Netherlands (Flemish Brabant) were an important outlet for a large number of beef cattle,

⁶⁶ Taken an average hectoliter weight of 76 kg. These yields were probably obtained with 2 hl of seed grain per hectare. Priester, 'Wheat yields in Zeeland', 1999, p. 318; *idem*, 'De geschiedenis van de Zeeuwse landbouw', 1998, pp. 285-293 and 501-609. See also: Hoppenbrouwers, 'Crop yields in Dutch agriculture', 1999, p. 114.

⁶⁷ During the 15th and 16th century the Haarlem *hoppensbier* was on the basis of 36 eights of oats malt and 10 eights of wheat malt. To make *koyt*, another sort of beer, a bylaw from 1407 ordered to use 12 eights of wheat malt, 18 eights of barley malt and 24 eights of oats malt. Van Loenen, 'De Haarlemse brouwindustrie', 1950, pp. 32-33.

⁶⁸ De Vries, 'The Dutch rural economy', 1974, pp. 69-71.



Illustration 1.4. Various dairy equipment used for processing milk into butter.

This early-19th century picture taken from Le Francq van Berkheys' book *Natuurlijke historie van Holland* (1811) shows the interior of a dairy room in a Zuid-Holland farm building. One of the women is busy skimming the milk with the help of a skimmer or fleeter. They used glazed earthenware pottery (testen) as well as shallow (wooden?) setting pans (melkmouwen or melkaden). Before, the milk was poured through a strainer (teems).

for which the cattle markets of 's-Hertogenbosch, Lier and Diest (the latter two in present-day Belgium) functioned as the principal distribution points.⁶⁹

In the course of the 16th and 17th centuries prices of livestock products rose, and here in Holland they did so relatively faster than grain prices; a trend that was contrary to what was happening elsewhere in Europe. On the one hand, it was the prosperity of the Dutch population that brought about a bigger demand for these more 'luxury' products. On the other hand, the increasing supply of Baltic grain had a downward effect on the prices of cereals in this country.

Both in Holland and in Friesland, it stimulated farmers in the peat and clay-on-peat soil regions to give up arable and focus entirely on livestock husbandry. And as they did so, their cattle numbers increased significantly. In parts of the Leeuwarderadeel district in Friesland, for instance, the number of cattle per farm rose from c. 14 in the years 1566-74 to c. 24 in the second half of the 17th century (Table 1.2). The number of dairy cows increased from 10 to

⁶⁹ Van der Woude, 'Het Noorderkwartier', 1972, pp. 574-575; Van Uytven, 'Sociaal-economische evoluties', 1972, p. 66; Van der Wee and Aerts, 'The Lier livestock market', 1979.

1.2. Farming in the coastal provinces

Table 1.2. The average size of cattle herds in parts of Friesland and Holland, 1550-1723.

	Total number of cattle per holding	Number of dairy cows per holding	Percentage of young cattle per holding	Percentage of inventories listing at least one bull
Friesland				
Leeuwarderadeel, Noordertrimdeel-district in which farmers increasingly specialised in arable farming				
1566-74	14.5	10.4	28.3	19.0
1583-99	17.3	11.8	30.6	32.7
1616-41	16.0	10.4	35.0	23.5
1677-86	16.1	9.7	39.8	26.7
1711-23	15.5	8.2	47.1	30.0
Leeuwaderadeel, Zuidertrimdee-district in which farmers increasingly specialised in livestock husbandry				
1566-74	14.1	10.4	26.2	11.8
1583-99	20.0	13.3	33.5	11.1
1616-41	21.1	14.1	33.3	21.4
1677-86	23.7	14.6	38.4	31.2
1711-23	24.8	13.0	47.6	40.0
Henaarderadeel-district in which farmers increasingly specialised in livestock husbandry				
1550-65	15.5	9.7	37.4	7.3
1595-1600	16.9	12.5	26.0	31.6
1646-54	18.0	12.1	32.8	30.3
Holland				
Woerden-district with prevailing livestock husbandry				
1651-61	25.2	17.4	31.0	-

Based on: De Vries, 'The Dutch rural economy', 1973, pp. 139-140.

15. In the area around Woerden (Zuid-Holland) the average number of cattle had grown to c. 25, around 1651-61. In the course of the 16th, 17th and 18th century the number of cattle per farm in a number of villages in the central parts of Holland quadrupled, as a substantial part of this increase had already occurred before 1650.

Although our knowledge of the history of livestock farming and dairying during the 16th and 17th century is still rather limited, it is clear that during this period a number of highly commercial and well-developed types of farming came about. In the northern part of Holland, for example, farmers concentrated more and more on the production of whole-milk cheese instead of butter and skimmed milk cheese. And it is quite possible that, through improvements in production techniques and the care with which the cheese was prepared,

it became more suitable for exports and consequently new export markets could be won. By the mid-17th century almost all the cheese which was shipped from the town of Hoorn, for instance, went to France and southern Europe.⁷⁰ France, in particular, became an important market for the cheese produced by the Noord-Holland cheese farmers.

In the southern parts of Holland, in the Rijnland and Delfland districts, however, dairy farmers concentrated on the production of butter as the remaining skimmed milk was processed into cheese. Butter from both regions was even more highly valued than that from Friesland, also a butter producing region.⁷¹ By the mid-17th century, for Friesian livestock farmers, some further away from the centre of the agri-economic field of force, cattle breeding had probably become more important than butter production by the mid-17th century. The town of Leiden was labelled as the most important butter market in Holland for highly sought after, first-class butter.⁷² The English ambassador Sir William Temple wrote in 1667: 'They [Dutch dairy farmers] send abroad the best of their own butter into all parts, and buy the cheapest of Ireland, or the North of England for their own use.'⁷³ But even so, exports of butter were far exceeded by those of cheese.

Various historical sources indicate that by the early 16th century, the cultivation of hemp must have been of widespread importance in the large zone of peat land of Holland and Utrecht – hemp then being an important crop as it produced the basic fibres to make a wide range of products from canvas⁷⁴ and fishing nets to all kinds of ropes. After that it appears that this special culture concentrated and increased in extent in the Utrecht/Holland borderland, especially in the Alblasserwaard, the Lopikerwaard and the Krimpenerwaard.⁷⁵ Hemp (*Cannabis sativa*) was grown here in a horticulture-like way, in small heavy manured hemp gardens (called *hennepwerven* or *hennepuynen*) situated at the head of the long, narrow strips of farming land – so typical for the settlements in this region – directly around the farm houses. Accordingly, however, the areas growing hemp covered only a small part of the total farming land that consisted mainly of grassland. For instance, in 1694 in the village of Laag Blokland in the Alblasserwaard surveyors registered 22 *morgen* (18.7 ha) of hemp gardens on a total of 352 *morgen* (299.7 ha) farming land – or merely 6% – spread over 22 farms. So, on average each farm held far less than about 1 ha of hemp land.⁷⁶ Unlike flax, hemp could be grown continuously on the same plot, thanks to a thoroughly worked top soil and heavy manuring. Besides farmyard manure, hemp growers also used dredgings from the ditches to manure their hemp plots. Almost all the manure their cattle produced went on to the hemp at the cost of their grassland.

⁷⁰ Lesger, 'Hoorn als stedelijk knooppunt', 1990, p. 35.

⁷¹ Boekel, 'De zuivelexport', 1929, pp. 41-46 and 82.

⁷² *Ibidem*, p. 54.

⁷³ Temple, 'Observations', 1667 (reprint), p. 119.

⁷⁴ The word 'canvas' is, in fact, derived from the Latin name for the hemp plant: *Cannabis*.

⁷⁵ A *waard* is a low lying, flat river polder. They came into being under the influence of rivers and are (partially) river locked. The latter is contrary to an *uiterwaard* which is situated outside the dyke, along the river.

⁷⁶ Verhagen, 'De hennepteelt', 1986, p. 87.



Illustration 1.5. Picture by Nicolaes Visscher (1550-1612), called D'oude lijnbaen (the old rope yard) demonstrates the various phases in the processing of hemp into ropes.

On the right, bundles of hemp are stored. In the left part of the picture, near the building with the signboard Henpclop (Hemp beat), various stages in the processing of hemp fibres are shown. It shows how by beating the finer qualities of fibre were produced, which were then used for the production of sailcloth (canvas) after spinning. At the back of the picture hemp fibres are being spun into ropes in a ropewalk. Source: Nederlands Openluchtmuseum, Arnhem.

From the Late Middle Ages onwards there had been a great demand for hemp fibres and this demand was only to increase as the economy of the young Republic boomed. The herring fleet, the merchant fleet as well as the navy gave preference to hemp produced in the Netherlands for the manufacture of nets, riggings and cordage, and sails. Sail-makers required a finer type of fibre and hemp producers introduced specific processes in order to meet this demand. As such the commercial chain from raw material to finished product provided a living for a large number of specialists such as hacklers (who combed the fibres), spinners and weavers and sail canvas manufacturers made a significant contribution to the economy. According to Guicciardini the prosperity of towns like Woerden and Oudewater was completely dependent on the hemp industry. In the vicinity of these towns high quality hemp was grown ‘... in great abundance while almost all the nets and ropes used by the fishermen in Holland and Zeeland were made in these towns.’⁷⁷

⁷⁷ Guicciardini, ‘Beschryvinghe’, 1612 (1968), p. 224.

Yet, the processing of hemp, and more particularly, the process of ‘retting’, during which the cut stems of the crop were soaked in water in ditches to separate the fibres, led to a high level of environmental pollution. In 1646, the administrators of the Alblasserwaard district issued a decree stating that henceforth retting was limited to only certain places, because it caused ‘major pollution and infection’ of the waters, causing it to be ‘no longer suitable to be drunk by humans and animals’ and ‘making fishes die in great numbers.’⁷⁸

As the demand for ropes and canvas increased and hemp culture became ever more important, farmers combined the cultivation of the crop with dairy farming symbiotically in one farming system. Cattle not only produced the milk to be processed into whole milk cheese; it also produced the dung which was needed in great quantities to manure the hemp crop. This whole-milk cheese was sold on markets of which the one in Gouda became the most well-known. In the 1670’s the annual market supply of cheese amounted to as much as 6.4 million pounds.⁷⁹

Another important branch in livestock farming in the coastal provinces was the production and delivery of retail milk. As the Dutch town expanded, an increasing number of livestock farmers in their direct vicinity had applied themselves to produce milk for household consumption. For instance, around 1660, in the Amstelland region, south of Amsterdam, newly-built farmsteads were specially equipped for the production and daily delivery of household milk in that town.⁸⁰ There were hardly any young cattle to be found on the farms of these *zoetboeren*. They tried to maintain their production throughout the year by buying milk cows from everywhere possible. Similar dairy farms were to be found in the area north of Amsterdam and around other large towns. In 1677, the bailiff of Waterland, a region some 15 km north of Amsterdam, wrote that hardly any farmer there was making cheese or butter any longer, since they all had gone over to the production of household milk that they sold in the city.⁸¹

As these specialised forms of dairy farming developed, farmers tended to stop rearing their own dairy cows as all milk was either processed into cheese or butter or sold. Calves that were born each spring to get the milk stream going were sold directly after being born, to be able to maximise dairy production. To keep their stocks up to their number, they began to buy heifers in calf and young dairy cows from elsewhere, that is to say from Friesland and Groningen. There, farmers began to dedicate themselves in particular to breeding. Cattle dealers from Holland went to these northern regions each year in the early spring to buy young dairy cattle, going from one farm to the next. Subsequently these animals were transported by ship or on the hoof to Holland. Amsterdam, Rotterdam, Leiden, Delft and other towns in the Rijnland and Delfland districts became important market centres for young dairy cattle.

⁷⁸ Bieleman, ‘Landbouw en milieu als spanningsveld’, 1992, p. 21.

⁷⁹ De Vries, ‘The Dutch rural economy’, 1974, p. 160.

⁸⁰ De Jong, ‘17de eeuwse landelijke bouwkunst’, 1988.

⁸¹ Van der Woude, ‘Het Noorderkwartier’, 1972, pp. 568 and 700 (ref. 11).

As breeding was limited and only intended to get the milk stream going each spring, meat production stagnated on balance. Yet, at the same time the demand for meat increased, due to the relatively high standards of living of the urban population and even more so to meet the growing demand for salted meat for provisioning the navy and commercial fleet, and for exports to the colonies. This all led to an increase in imports of slaughter cattle – oxen mainly – from abroad following the end of the Middle Ages. By then already, the fattening of beef cattle had become an important source of income for farmers in Noord-Holland, according to the *Enquete* and *Informacie*. And most of these oxen were destined to be sold to towns in Flanders and Brabant. To supply the growing home market, however, there arose an increasing flow of oxen, coming all the way from Northern Germany and Denmark by the end of the 15th century.⁸² And during the first half of the 17th century their numbers had increased to several tens of thousands each year. Most of these oxen came on hoof, some others, however, were brought in by boat.

The oxen trade involved a highly sophisticated commercial network between the Dutch market and the Danish producers and it was organised by special trading *compagnieën* (companies). After having arrived here in the spring, the animals were fattened during the summer to be sold and slaughtered in the autumn. Supplementary to the Danish and Northern-German oxen, a remarkable number of them were also supplied from regions in the eastern parts of the young Republic, for instance Drenthe.

In addition to dairy farming and especially on the islands of Texel and Wieringen (Noord-Holland) and the Friesian island of Grind, sheep-farming for the production of sheep's cheese had long been important. The *Enquete* of 1494 suggests that the Texel sheep farmers sold their green sheep cheese, with their typical truncate cone, far into the eastern hinterland. In 1561 on the island of Texel 12,000 ewes had been registered.⁸³

Productivity in dairy farming in Holland and Friesland must have been exceptionally high compared to European standards at the time, and many a foreign visitor expressed his astonishment at the performance of the livestock farming sector.

Around 1570, for instance, Guicciardini wrote full of surprise about the extent of milk production in the land north of Amsterdam.⁸⁴ Based on figures he provides Dutch dairy cows would produce about 2,000 litres per year and it is believed that milk production must have increased significantly during the whole of the 16th and 17th century.⁸⁵ This was achieved not only by using high quality fodder and concentrates, but also by purpose-designed breeding strategies.⁸⁶

⁸² Gijsbers, 'Kapitale ossen', 1999.

⁸³ Jansma, 'Bijdrage', 1951, pp. 526-527 and 536.

⁸⁴ Guicciardini, 'Beschryvinghe', 1612 (1968), pp. 9 and 193.

⁸⁵ De Vries, 'Peasant demand patterns', 1974, p. 215.

⁸⁶ Bieleman, 'De georganiseerde rundveeverbetering', 2000.

Horticulture

As the Dutch urban population grew and prosperity increased for many of them, a number of horticulture centres were set up. The sector, of course, was benefiting greatly from the rise of a well-equipped and sophisticated water transport system.⁸⁷ In contrast to fruit farming, which in some regions emerged as firmly attached to standard farming, horticulture in Holland began in the vicinity of the towns. The first centres of professional market gardening developed near towns like Leiden and Delft. And as towns expanded horticulture experienced a boom and new centres came into being, like De Langedijk and the Enkhuizen district.⁸⁸ De Langedijk, an area north of Alkmaar, became known for its onions, horse radish, canary, mustard and coriander seed, as well as for carrots and parsnip. In the Enkhuizen district, in the densely populated area called De Streek, cultivation of vegetables like cabbage and carrots was alternated with other (arable) crops. In Beverwijk and Heemskerk, market gardening came into being in particular after 1610. And by the mid-17th century horticulture here was described as a business 'in daily increase'. These areas all enjoyed the advantage of having direct access to Amsterdam across the IJ-water, and kept up a regular schedule of market boats importing night soil, and exporting garden produce.⁸⁹

Two villages became well known as centres for arboriculture in particular. The first, Aalsmeer, also produced several kinds of fruit, especially strawberries. Regular barge services delivered these products several times a week to Amsterdam. The other, Boskoop, had about twenty tree nurseries in 1612, which exported their products to all parts of Europe. Across the Zuiderzee, in Friesland, the district of Barradeel around the village of Berlikum became an important centre for market gardening as well.⁹⁰ Still, there is no question that of all the places mentioned Leiden was the leading horticultural centre during the Golden Age. All kinds of products were sent from here to near and far. The intensive way in which market gardening was practised here, is evidenced by the fact that horticulturists tried to have a number of crops in a row every year.

This short survey of the 17th century Dutch horticultural sector would not be complete without mentioning the flower bulb culture, especially of tulips. During the first decades of the 17th century they became the pre-eminent flower of fashion. Prices increased and trade in bulbs became highly speculative. The years 1636-37 became notorious as a result of the full-blown boom on the stock exchange, known as *tulpomania* (*bolleknasernie* or *tulpomanie*). It was followed by a crash, of course, but although prices fell dramatically, the trade itself survived. After being stripped of its excesses, bulb cultivation and trade remained important as a speciality for a small group.⁹¹



⁸⁷ De Vries, 'Barges and capitalism', 1978.

⁸⁸ The following is mainly based on: Sangers, 'De ontwikkeling', 1952 and De Vries, 'The Dutch rural economy', 1974, pp. 153-155.

⁸⁹ De Vries, 'The Dutch rural economy', 1974, p. 154.

⁹⁰ Faber, 'Drie eeuwen Friesland', 1972, p. 178.

⁹¹ Krelage, 'Drie eeuwen bloembollenexport', 1946, pp. 7, 45ff and 473ff.

A very horticulture-like culture that had developed in the western-most parts of the river clay district, in the far-eastern parts of the old county of Holland on the natural levee soils along the river Maas, was the cultivation of hops (*Humulus lupulus*). The *Enquete* from 1494 already mentioned the importance of the hop culture in a number of villages there. In the village of Veen, for instance, virtually all households had a hop garden, although these gardens were very seldom any larger than one *morgen* (0.85 ha). The village had 570 *morgen* of farming land in total, including 33.5 *morgen* or 6% of hop gardens. The region joined in with a corresponding hop area around the town of 's-Hertogenbosch.

After being dried, the female flowers of hops, the hop cone, were used as an important raw material for beer brewing. Hops had thus replaced the gruit – a mixture of different herbs including sweet gale. Adding hops to the brew made beer less perishable and therefore more suitable for long-distance transport and therefore trading. Much of the hops that was produced in this region was sold to breweries in traditional Dutch beer towns like Haarlem, Delft and Gouda, as well as – later on – Amsterdam and Rotterdam. In the latter town, for instance, 21 new breweries were established between 1600 and 1621.⁹² Hop is a perennial crop that shot up every year and every individual plant was grown on small plant hills (*hoppekuilen*). This way the large quantities of manure the plant needed could be used economically, while it facilitated the tending of the crop. As a result of all these aspects the hop culture was known to be very labour and capital intensive. At the same time the hop market was characterized by major price fluctuations uncommon to other crops. As the crop was also very susceptible to diseases, the hop culture had an almost speculative character.

The 'great rebuilding'

The changes in farming in the coastal provinces over the course of the 16th and first half of the 17th century went hand in hand with an ever growing input of labour and capital encouraged by increasing profitability. The latter is evidenced in particular by the rapidly rising rents and land prices especially after 1580 (Figure 1.1).⁹³ The growing profitability also appears from the investments individual farmers made to improve their farmland and to rebuild farmsteads and, of course, the energetic way in which large sums of money were invested in numerous land-reclamation projects. During the first half of the 17th century, in Holland and Utrecht alone, the area of reclaimed lakes (*droogmakerijen*) was about twelve times as high as in the preceding half century.⁹⁴

The flourishing of farming is particularly visible in the changing architecture of the farmsteads. From the 16th century onwards the use of wood and loam gave way to bricks, while reed and straw were replaced by tiles.⁹⁵ Also, new and more efficient, larger types of

⁹² Noordegraaf, 'Nijverheid', 1980, p. 77.

⁹³ Kuys and Schoenmakers, 'Landpachten', 1981, p. 58 Table 7; Van der Woude, 'The long-term movement', 1978, p. 179, graph 4.

⁹⁴ De Bakker and Staal, 'Natuur en techniek in bodem en landschap van Nederland', 1978; Schulz, 'Waterbeheersing', 1992.

⁹⁵ Voskuil, 'Van vlechtwerk tot baksteen', 1979.



Illustration 1.6. The hop harvest as it was painted on wallpaper by the painter Hendrik Meijer (1737-1793). After the stalks had been cut off they were brought into the house of the hop grower where the cones (the female flower of the hop) were plucked. After drying the cones on an oast, they were sold to the brewing industry. From the Late Middle Ages onwards hops became an important raw material for beer production. Source: Stedelijk Museum De Lakenhal, Leiden.

buildings came about. At first, farmers still contented themselves with enlarging the existing types of farmstead. From probate inventories in the Friesian district of Leeuwarderadeel it appears, for instance, that the traditional medieval Friesian farmstead, the so-called *langhuis* (long house)⁹⁶, had an average of nine *vakken* or sections. By the mid-16th century the need for more stall room had forced farmers to extend this number of sections and by the 1570's half of the inventories listed separate milk rooms, although hay was still being stored in a separate haystack.⁹⁷ However, just before 1600, a fundamentally new type of farmstead appeared that was considerably larger and brought livestock and fodder together under one roof. Because of its silhouette, it became known as the *kop-hals-romp* (head-neck-trunk) type: the head containing the (cellared) living quarters and the 'trunk' the aisled barn, with

⁹⁶ Compare: Mulder and Van Olst, 'Het Oud-friese langhuis', 1996.

⁹⁷ De Vries, 'Peasant demand patterns', 1974, pp. 216-217.

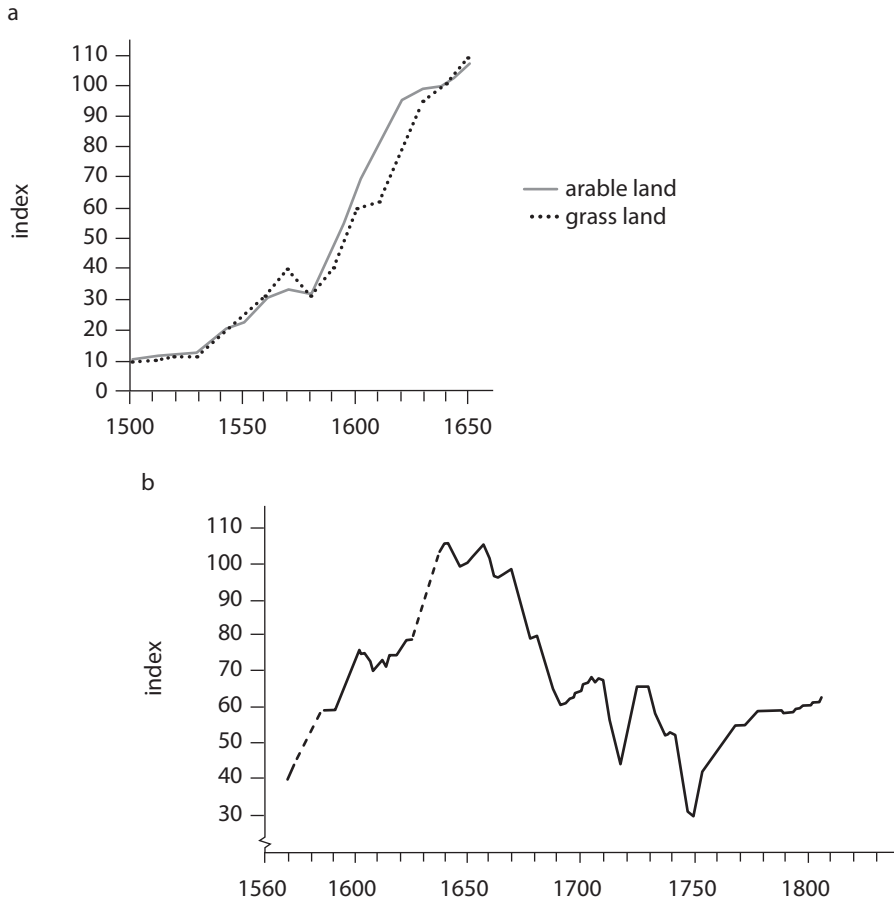


Figure 1.1. Rent prices of farming land in the province of Holland in the 16th, 17th and 18th centuries. (a) The index of rent prices of grassland and arable land in the south-western part of the province of Holland in the period 1500-1650; 10-year averages (index: 1640 = 100). Source: Kuys and Schoenmakers, 'Landpachten', 1981, p. 58 Table 7. (b) The index of rent prices in the western parts of Noord-Holland in the period 1570-1805; 7-year moving average (index: 1640-46 = 100). After: Van der Woude, 'The long-term movement', 1978, p. 179 Graph 4.

the harvest being stored in the centre. Around the middle of the 17th century this type also spread into the western part of the adjacent province of Groningen and further eastward.

Under the same conditions, in the northern parts of Holland the so-called *stolp* (literally: bell-shaped glass to conserve cheese) farm came into being in about 1600. This very efficient concept, which probably came to fruition on the drawing board of an engineer, housed all



Illustration 1.7. The farm Mewensoort at the Schenkeldijk in the village of 's-Gravendeel in the Hoeksche Waard as it was painted in 1940.

The farm was built in 1675 and as such represented a farm type that had become standard on the Zuid-Holland islands throughout the 16th and 17th centuries. Source: Collection Gemeentearchief Rotterdam.

farming functions together under its characteristic pyramidal roof, with the haystack in the middle.⁹⁸

Along with the 16th and 17th centuries diking-in offensive in the south-western delta region, came the introduction of a new concept to build farmsteads there. One of the main characteristics of this newly developed concept was the combination of a separate one-aisled dwelling house constructed of bricks and a large wooden barn containing storage space for the harvest and stables for cattle and horses. The house was usually built as a detached structure. It was a type of farmstead to accommodate the medium-sized and large, commercial holdings that dominated the new marine clay polders.⁹⁹ From this moment on, new types of farm buildings like these became a prominent appearance on the rural landscape of coastal provinces.

⁹⁸ Hekker, 'De ontwikkeling van de boerderijvormen in Nederland', 1957; Hekker, 'Historical types of farms', 1991; Brandts Buys, 'De landelijke bouwkunst in Hollands Noorderkwartier', 1974.

⁹⁹ Van Cruyningen, 'Schone welbetimmerde hofsteden', 2002.

1.2. Farming in the coastal provinces

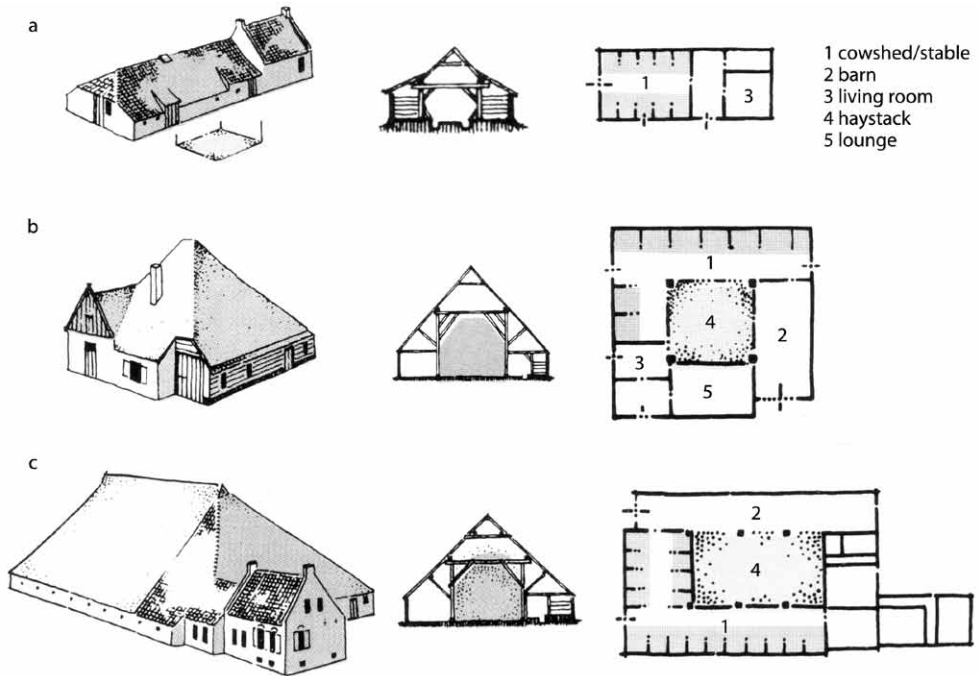


Illustration 1.8. The old Friesian longhouse and its successors.

Until well into the 16th century the dominant type of farmhouse in the whole north-western and northern coastal region was the so-called Friesian longhouse with a free-standing haystack in the yard (a). Initially, farmers tried to obtain more stabling room for their increasing stock numbers by expanding the number of bays. However, already before 1600, completely new and much more efficient solutions were introduced. In North Holland the so-called stolp was introduced and spread rapidly. All functions were accommodated under one, big pyramid-shaped roof (b). Experts nowadays believe that this very efficient concept originated on the drawing board as an engineer's design. Around about the same time in Friesland the kop-hals-romp type (= head-neck-trunk; after its characteristic silhouette) originated (c). Around the mid-17th century this type spread in the western parts of the province of Groningen. A subsequent development of this type of farmhouse was the so-called stelp. This solution caught on mainly after 1700. Source: Hekker, 'Historical types of farms', 1991.

1.3. Farming in the interior provinces

The interior of the country is dominated by a landscape based on sandy soils. Sometimes it is flat, sometimes it has a weak, undulating relief, sometimes it is slightly hilly. In all, about 40% of the whole country consists of this type of landscape. At first sight, settlements here are laid out in rather disorderly fashion, like islands in an ocean of wastelands consisting of marshes, heathery moors and bogs.¹⁰⁰ Where the morphology of the sand landscape and the further conditions of the soil allowed, large, more or less unbroken, open complexes of arable land were established during the High Middle Ages.¹⁰¹ The companion villages were usually laid at the edges of these complexes, in the intermediate zone between the higher and the lower parts of the landscape. The meadows, which were crucial to the farmers as they provided the winter fodder for the livestock, were laid out in the lower parts, in the shallow valleys accompanying brooks and small rivers. The remaining land, the wastelands – the quasi endless moors and marshes – were used as commons. They were many times as large as the area of arable land and they played an important role in the agricultural production, as they were lands for pasturing the village herds, consisting of cattle and horses. Sometimes, pigs were tended in the remains of the old, medieval forests.

The arable, however, was the pivot on which all farming activities turned. In the north-eastern and eastern parts of the country the open, unbroken complexes were indicated as *essen*, *engen* or *enken*; in the south they were called *akkers* or *velden*.¹⁰² Where the morphology of the landscape was more small-scale the arable was laid out on what were called individual *kampen*, girded by hedge banks. As such, the *essen*, *engen*, *akkers* and *velden* were all equivalents of the so-called ‘open-fields’ that formed the basic type of settlement all over north-western Europe.

Usually the arable of the holdings was laid out over a large number of strips, scattered all over the ‘open-field’. An example from the province of Drenthe: in 1650, the village of Loon (near the country town of Assen) totalled eight holdings (Map 1.1). Their arable with a total of 76 ha consisted of more than 220 plots; each holding contained an average of 28 plots with an average size of 0.34 ha.¹⁰³ All in all a very inefficient situation, seen through our modern eyes.

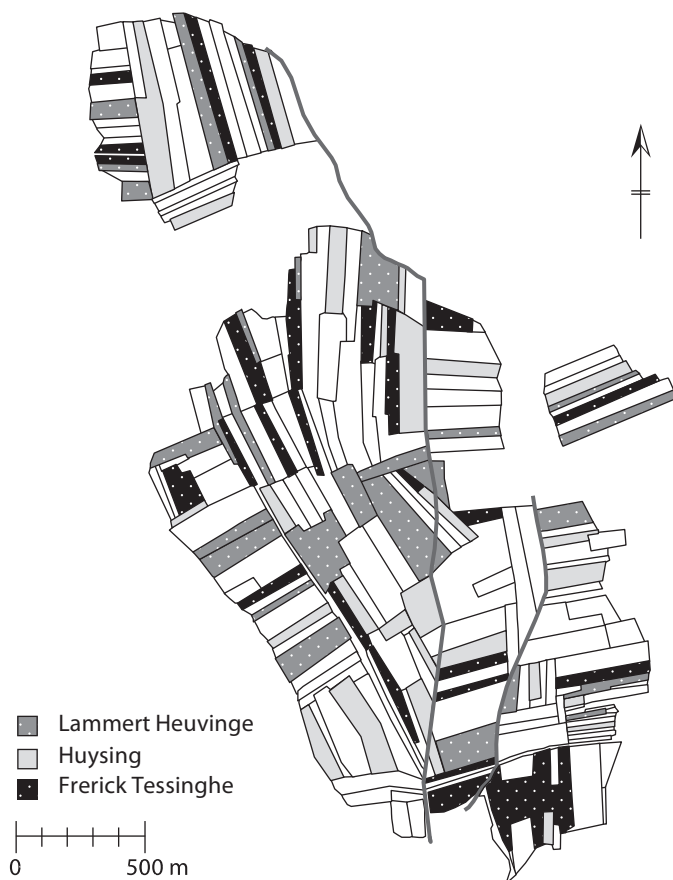
Yet, the seeming disorder had several, important advantages for farmers back then, like for instance, the spreading of risk under a farming regime with a low level of productivity. Yet, it had to be made workable and in time a comprehensive and sophisticated series of regulations came into being, for all members of the farming community who had their arable on the open-field. These regulations regulated a large number of different aspects of farming and farming life, such as which crop had to be cultivated on which part of the open-field,

¹⁰⁰ In this chapter on the agricultural history of the inland provinces, we will restrict ourselves to the sandy parts of the country. Other districts, like parts of the river clay district and the Zuid-Limburg loess-covered peniplane, will be dealt with in the next part of the book.

¹⁰¹ Spek, ‘Het Drentse esdorpenlandschap’, 2004.

¹⁰² Daan and Blok, ‘Dialecten en Naamkunde’, 1963-1977, map X-2c.

¹⁰³ Bieleman, ‘Boeren op het Drentse zand’, 1987, p. 576.



Map 1.1. The open field of the village of Loon (near Rolde, in the province of Drenthe) in 1654. Indicating the strips of arable land of three holdings. The village itself is situated at the most southerly end of the complex. Loon counted as much as eight holdings in total, having an area of arable land of 76 ha altogether, spread over more than 220 plots. After: Bieleman, 'Boeren op het Drentse zand', 1987, p. 575, Map 6.1.

as well as the crucial pasturing of the village herd on the stubbles after the harvest had been removed. The latter was especially important as this pasturing was a way of manuring the arable with a strict minimum input of labour by the animals leaving their droppings behind in the field. For this reason grazing the stubbles was not merely a right that farmers allowed each other, it was also one that was wanted more than tolerated.¹⁰⁴

¹⁰⁴ To emphasise the strong communal and collective character of the open-field system, some prefer to speak about 'common-field farming'. Thirsk, 'The origin of the common fields', 1984.

Apart from the communal grazing of the stubble – in fact causing the the open-field to be used as a pasture as much as a complex of arable land– the fertility of the land was maintained by manuring it with a composted mixture of animal excrements and all kinds of organic litter and/or sods of organic material cut and gathered in the commons. The latter was in principal a way in which to enrich a relatively small area of arable land with the plant nutrients of the much larger area of common wastelands.

The distinction, however, between the arable on the open-fields on the one hand and the uncultivated commons on the other, was much less rigid than earlier historians suggested. It is clear that even in the 17th century only a part of the open-field was actually ‘under the plough’ and regularly manured: the infield. Another part, the outfield, usually the newly reclaimed fringes of the open-fields, was left uncultivated for a number of years, after one or two – usually very meagre – crops had been harvested. Contemporaries called this *dries leggen*. Around 1650, farmers in the Drenthian villages of Odoorn argued that at least one quarter of their arable land had to be left in ley each year.



The difference in population densities in the three distinguishable districts – the north-eastern sands (Drenthe and Westerwolde), the central sands (Overijssel, parts of Utrecht, the Veluwe and the Achterhoek) and the sands of Brabant and Noord-Limburg – suggests that the rural economies in these districts already had quite a different character at the beginning of this period. And the way farming in these distinguished districts evolved was far from similar.

As yet, until far into the 17th century farming on *the north-eastern sands* (in the province of Drenthe and in the Westerwolde district) kept its labour and capital-extensive character. In fact, Drenthian farmers scarcely had any choice. A low population density (7 to 8 persons per km²) was linked to a rural society that was barely differentiated in socio-economic terms. Scarcely 7% of the population earned its living primarily outside agriculture, as a miller or a blacksmith, etc. This situation went hand in hand with farms that were remarkably large, broad-based, and held an striking number of cattle and horses. At the same time, the number of sheep appear to have been much smaller than during the late 19th century. An early 17th-century record remarked that a *vol bedrijf* (literally: a ‘full farm’, i.e. a farm that had full rights in the commons) held about 9 ha of arable land in the open-field, as well as an average of 24 head of cattle (as a comparison: according to the 1910 cattle census the average number of cattle was about 7). In reality, their numbers may even have been a lot higher. Farms like these usually had four adult horses (Table 1.3).¹⁰⁵

As for their cattle, these farmers operated in an interregional labour division for beef production, like their colleagues in northern Germany and Denmark. As such, they had focussed on the breeding of slaughter cattle, i.e. oxen. Unlike later on, Drenthian farmers kept all of their bull calves, and after being castrated these young animals were forced to find a great deal of their daily rations when they were pastured on the commons. Then,

¹⁰⁵ Bieleman, ‘Boeren op het Drentse zand’, 1987.

Part 1 – The period 1500-1650

Table 1.3. The number of farmers according to their number of (adult) horses in 16 parishes in the province of Drenthe, in 1672; Drenthe totalled as many as 37 parishes.

	Number of farmers	In %
4 horse farms	531	50
3 horse farms	116	11
2 horse farms ¹	414	39
Total number	1,061	100

Source: Bieleman, 'Boeren op het Drentse zand', 1987, p. 282.

¹ Farms with only one horse hardly occurred in Drenthe at the time.

after 3 to 5 years, these oxen were sold and driven to districts with high quality pastureland to be fattened over one summer for slaughter in the autumn. As such the joint farmers in this province were probably able to export about 3,000 to 5,000 oxen annually, mainly to Holland but also to Flemish markets.



Illustration 1.9. Cattle grazing on the commons of the village of Zeegse in the province of Drenthe, in about 1910.

The picture demonstrates that the heather wastelands were certainly not the exclusive domain of sheep. And what still was a daily practice during the early 20th century, was certainly one during the 16th and 17th century. Source: Drents Museum, Assen.

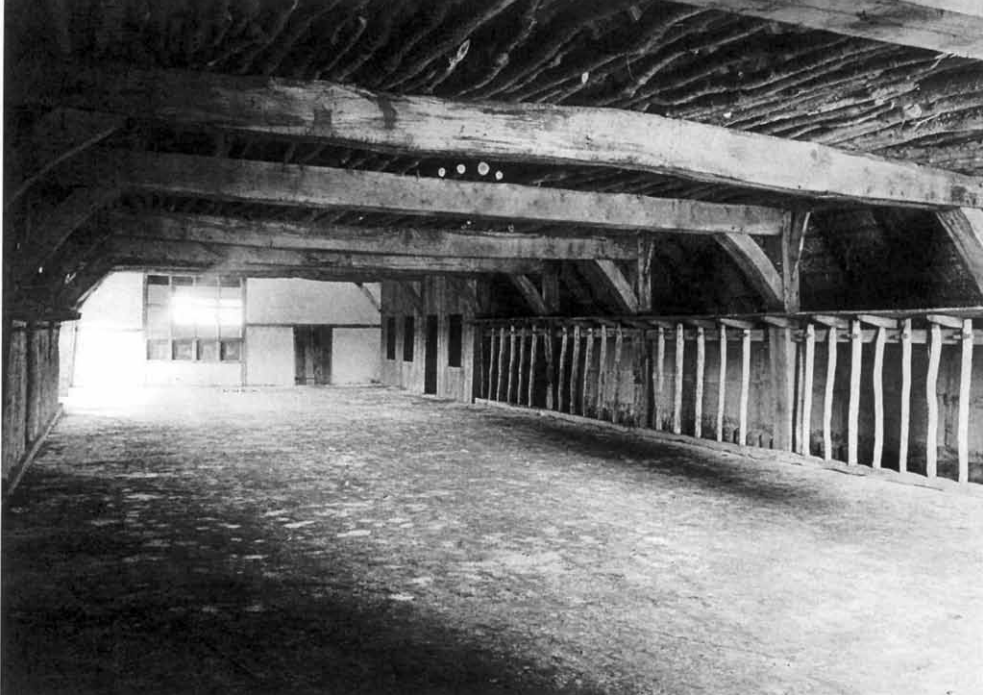


Illustration 1.10. The threshing floor and cow stands in the side aisles of the Bruntingerhof farm in the village of Orvelte (Drenthe).

The farm was restored in the 1970's to its former state as it was around 1750. The photo gives a good impression of the standard farm type that prevailed in Mid- and Eastern-Drenthe then with its large number of cattle (partly oxen) and the stock of 4 adult horses. A farm like this held about 8 ha of arable land. In the course of the 18th century, as rye productivity increased, farms like these were extended with an extra section at the front part to increase the storage space in the attic. Source: Collection: Monumentenzorg Drenthe, Drents archief.

As regards their horses too, farmers in Drenthe functioned in an inter-district division of labour. Foals born in the early spring were sold through a number of big, annual foal markets in the month of September to farmers in the northern marine clay districts, to be reared and then sold again as trained horses.

Initially sheep keeping played a minor role in Drenthe. However, as the demand for native wool increased, after 1580, farmers extended their flocks. And this growth continued up to about 1650. In many places, however, the increasing grazing pressure on the commons caused erosion of the vegetation followed by an expansion of the drifting sand complexes. The latter became an increasing menace, as they often threatened to cover the arable on the open-fields, or even the villages. Around 1650, farmers in the village of Dwingeloo complained that their commons were 'dusted to sand' (*'onse heydevelt geheel to zandt*

verstoft’) and large parts of their open-field had become covered with drifting sand, making it infertile.

As elsewhere in the sandy district, rye (*Secale cereale*) was the farmers’ principal crop, after the Early Middle Ages, as it had several advantages under the conditions there. Rye ripens early in the growing season – earlier than other cereals do – and it can therefore manage on very little water; a quality that was very important on drought-sensitive sandy soils. It was cultivated in an alternation of winter sown and summer sown crops. As a summer sown crop, rye had gradually ousted barley and oats in the course of the 16th century. Yet, because of the low labour-input regime and the multiple use of the open fields, yields were low. In the 17th century yield ratios were no higher than 1:3 or 1:4 in very good years, being roughly the equivalent of 700 to 850 kg/ha (as a comparison: around 1850 this level had increased to about 1,200 kg/ha).¹⁰⁶

Although in general farming in Drenthe was characterised by a low level of labour input, in some of the northern-most villages the situation was different. There, within the economic reach of the city of Groningen the cultivation of hops had come to flourish since the Late Middle Ages. Most of the hops were indeed sold to brewers in Groningen, while in return, the hop growers were supplied with costly night soil from this city to manure their crop. However, in addition to the town of Groningen, Drenthian hop growers sometimes also sold their product to Ostfriesland and the county of Bentheim (both in present-day Germany). The uncontested centre of hop cultivation here was the village of Peize. In 1650 83 hop growers in this village, consisting of 87 households, cultivated an area of 35 hectares of hop gardens, containing more than 86,500 plant hills, more than half of the total number in the district.¹⁰⁷



Although farming on the north-eastern sands retained its overall low labour-input character during the 16th and 17th centuries, in the sandy districts closer to the then focus of the Dutch economy, the price revolution that occurred in this period induced a process of intensification and specialisation. This meant that in the ‘central sandy districts’, that is to say the Veluwe district (in the province of Gelderland), as well as in Overijssel, a process of arabilization took place that was very similar to what happened in the marine clay district in Friesland; German scholars speak in terms of a *Vergetreidungs-Prozess*; (the German word *Getreide* means ‘cereals’ or ‘grain’). One thing that clearly points that way was the rather spectacular decrease in the number of farm animals. In the early 16th century all over the Veluwe district a very high complement of farm animals – especially horses and sheep – was still to be found.¹⁰⁸ According to a census held in 1526, the total number of horses, for instance, was as high as 13,000, while in the early 19th century there were only 6,000, while

¹⁰⁶ Bieleman and Roessingh, ‘Wie zaait zal oogsten’, 1994.

¹⁰⁷ Bieleman, ‘De Noord-Drentse hopteelt’, 1981.

¹⁰⁸ Roessingh, ‘De veetelling van 1526’, 1979.

1.3. Farming in the interior provinces

the major part of this process had already occurred before 1650 (Table 1.4a and 1.4b). Then, in 1526, 75% of all Veluwe holdings had three or more adult horses.

In Overijssel a similar situation was to be found (Table 1.5). In 1602 about one third of the holdings had four or more horses; in the arable farming district of Salland in this province the share was even as high as 54%. In the early 19th century stocks like these no longer existed.¹⁰⁹

Table 1.4a. Farmers in three parishes in the Veluwe district according to their number of (adult) horses, in 1526 and 1650.

Number of horses per holding	1526		1650	
	number of farmers	in %	number of farmers	in %
1 or 2	86	23	197	60
3 or 4	155	41	131	40
5 and more	133	36	1	0
Total number of holdings	374	100	329	100
Total number of horses	1,460		740	
Average number of horses per holding	3.9		2.2	

Table 1.4b. Farmers in the Veluwe district according to their number of (adult) horses, in 1526 and 1807.

Number of horses per holding	1526		1807	
	number of farmers	in %	number of farmers	in %
1 or 2	934	29	2,559	83
3 or 4	1,181	36	467	15
5 and more	1,104	34	73	2
Total number of holdings	3,219	100	3,099	100
Total number of horses	15,200		7,300 ^a	
Average number of horses per holding	4.7		2.4	

Source: Roessingh, 'De veetelling van 1526', 1976, p. 12.

^a1812.

¹⁰⁹ Slicher van Bath, 'Een samenleving onder spanning', 1957, pp. 527-537.

Part 1 – The period 1500-1650

Table 1.5. Farmers according to their number of (adult) horses in Overijssel (except for the towns), in 1602.

	1 horse		2-3 horses		≥ 4 horses		Total	
	abs.	in %	abs.	in %	abs.	in %	abs.	in %
Salland, arable farming district	50	5	445	41	592	54	1,087	100
Salland, livestock farming district	165	22	394	52	195	26	754	100
Twente	179	12	841	59	417	29	1,437	100
Land van Vollenhove	142	20	482	68	82	12	706	100
Total	536	14	2,162	54	1,286	32	3,984	100

Source: Slicher van Bath, 'Een samenleving onder spanning', 1957, p. 528.

The striking decrease in the number of horses in the Veluwe as well as in the province of Overijssel, was caused by a fundamental change in the economic niche these horses occupied. Initially, just as in Drenthe, an important aspect of horse-keeping had been breeding, but in both the last two districts this aspect must have already lost its significance during the 16th and 17th centuries, as only the horse's role as a draught horse remained.

There was also an important shift in the role of sheep-keeping as part of the prevailing farming system in the Veluwe, as their numbers declined drastically over the course of time. In 1526 there were still as many as 111,000 sheep, but by the early 19th century this number had decreased to only about 40,000, a process of decline that must have already taken place largely before 1650. And as their numbers fell the sheep's role as wool producer receded, while their usefulness in manure production became more prominent.

One of the most striking features in this process of arablization was the spread of the cultivation of buckwheat (*Fagopyrum esculentum*), the great new crop of the Late Middle Ages. Although not a member of the family of *gramineae* or grasses like all grains, buckwheat proved to be a cheaper but good alternative due to the high starch content of its seeds while its protein content made it highly nutritious as well. And as cereal prices increased farmers profited from the fact that the demand for the cheaper substitute rose faster than the price of more high-grade cereals like wheat and rye. In addition to this, the leafy buckwheat plant proved to be an excellent ally in the farmers' continuous battle against weeds. Buckwheat prospers on the poorest soils, although a plot of land that was to be sown with buckwheat needed to be well prepared (sufficiently deep ploughed), and it is for this reason that it is ranked as a more labour-intensive crop than rye, for instance. Another minus was its extreme sensibility to night frost in the early summer season while it was flowering.

Later statistics, from the early 19th century, show that in the parishes in the central and western parts of the Veluwe district, as well as in the adjacent sandy districts of Utrecht



Illustration 1.11. Buckwheat.

Buckwheat is considered as the great, new crop of the Late Middle Ages. It is not a member of the Gramineae family as most grains are, but of the Polygonaceae. For farmers the leafy crop had a number of advantages. Yet its culture was very uncertain as the plant was very vulnerable to night frost. Beside the plant, a nut is depicted. Source: Høst and Bregnhøj, 'Landbouwgewassen', 1980.

and Het Gooi (part of Holland southeast of Amsterdam) some 40 to 50% (or more) of the sown arable was sown with buckwheat. The problem, however, was that the cultivation of buckwheat was incompatible with the then current system of common grazing, and while buckwheat cultivation spread the communal nature of open-field farming vanished to make room for a much more individually orientated system. On the open-fields of the Veluwe district (the *engen*) the stubble grazing regime, still functioning in the early 16th century, was inconceivable about a century later, as it was on the other side of the river IJssel, in Overijssel.

As the common grazing of the open-field declined, farmers were compelled to maintain the fertility of their arable land by manuring it with a composted mixture of their animals' dung and sods of heather produced in the deepened *potstal* or pit stall. And in time they learned from experience that increasing the volume of sods did indeed have a positive effect on the productivity of the arable. In fact by doing so – as we now know – they increased the amount of nutrients taken from the vast area of the common heather lands to the much smaller area of their arable.

Reducing the system of the communal stubble grazing was probably also instigated by the farmers' desire to cultivate fodder crops like spurrey (*Spergula arvensis*), vetches (*Vicia sativa*) and turnips (*Brassica rapa*). The early 16th century by-laws in the village of Varsen (near Ommen, in Overijssel) mention turnips, as they were cultivated after the rye harvest, whereas the common herding of sheep was explicitly forbidden on this land.¹¹⁰ From that point on these fodder crops gained in importance.¹¹¹

Very typically for the market-orientated character of farming in the western parts of Veluwe district in particular, was the emergence of tobacco cultivation during the first decades of the 17th century. Around 1620, on the initiative of Amsterdam merchants, landowners spurred on their tenants to take up this crop in their cropping scheme. Initially, the culture seems to have functioned as a sort of buffer provision between the very irregular supply from overseas and the growing sale potential here in Europe. Soon, however, it became a business in its own right.

Yet, tobacco (*Nicotiana tabacum*) was an exotic plant and it was only through many adaptations (some of them derived from the horticultural sector) and improvements that its cultivation became suitable for the current farming practice here. One of these innovations was the introduction of hotbeds, providing well-developed planting material at the beginning of the growing season. These hot beds had recently been introduced in horticulture. Another important innovation was the use of special sheds for the drying of the leaves, after they had been plucked – carefully and one by one – from the stems. Both of these innovations had been widely spread prior to 1690. After the crop had been harvested and dried, it was transported to Amsterdam for further processing.

Around the middle of the 17th century tobacco cultivation was to be found in the vicinity of towns like Amersfoort, Nijkerk, Rhenen, Wageningen, Arnhem, Hattem and

¹¹⁰ Van Zanden, 'De economische ontwikkeling', 1985, p. 170.

¹¹¹ Compare: Bieleman, 'De verscheidenheid van de landbouw', 1990.



Illustration 1.12. Detail of a copper engraving made by Paul Liender in 1759 showing a tobacco plantation near Amersfoort.

Shortly after the middle of the 17th century in the surroundings of the town of Amersfoort and in the western parts of the Veluwe districts special sheds were introduced for the drying of tobacco leaves. To regulate the drying process the shed is provided with vertically moving hatches. The plucked leaves were hung to dry after they had been girded on spindles. On the left side of the picture an elder hedge to protect the growing crop from the wind can be seen. In the front part we see the hilled-up ridges with deeply topped tobacco plants. Source: Het Utrechtsarchief, Utrecht; Prentenverameling inv. Müller, nr. 414.

Elburg.¹¹² In Wageningen, for instance, at least 24 *morgen* (\approx 21 ha) of arable land were planted with tobacco in 1646. As these primary centres emerged during the first half of the 17th century, they had a radiating effect on their surrounding districts, especially during the second half of the 17th century amidst changing economic circumstances.

A remarkable increase in the area of cultivated land in the Veluwe district underlines the fact that farming was a booming business during the first half of the 17th century. Elsewhere,

¹¹² Roessingh, 'Inlandse tabak', 1979; *idem*, 'Tobacco growing in Holland', 1978.

in Twente, an increase in production was obviously the reason behind expanding the set-up of the existing type of farm.¹¹³



There is still very little known about the agricultural developments during this period in the 'southern sandy districts', for example, the present province of Noord-Brabant and the northern part of Limburg. What is clear, however, is that the prevailing farming system in Brabant was an important intermediate phase between the intensive and sophisticated farming system that had developed in Late Medieval Flanders and those in the rest of the (northern) Netherlands.¹¹⁴ Besides rye, the most important crop, barley and oats were the prevailing spring sown cereals. In some parts, already in the mid-16th century, buckwheat was cultivated on a rather large scale. And it seems that this crop gained importance thereafter, ousting barley from the arable. Around the middle of the 17th century the share of buckwheat in rent revenues had exceeded barley.¹¹⁵ It is clear that by then the communal grazing of the stubble after the harvest – still practised in the eastern and north-eastern sands of the Netherlands – was already a by-gone practice here on the Brabant open-fields. At the same time spring sown spurrey also appeared on the scene as a main crop.

As the cultivation of spurrey (as a main crop and an after crop) together with other after crops became an inextricable part of the Noord-Brabant cropping system, the prevailing farming system already involved stall feeding. As such, and thanks to the spurrey pastures, the western parts of the Noord-Brabant sands produced increasing amounts of butter. During the late 16th century increasing quantities of butter coming from the Campina (as these part of the present-day province were called) were supplied to the Antwerp market.¹¹⁶ In many villages butter mongers bought butter from the farmers to sell it again at the larger, district markets. The so-called *herfstboter* (autumn produced butter) in particular, made in the month of October, was much sought after. In the 17th century, butter was considered to be one the riches of the district.¹¹⁷ While at the end of the Middle Ages the mainstay of the farming system was still the production of cereals, sales of butter continued to gain in importance thereafter.

There were also a number of special crops that gained due attention and some areas, such as different kinds of oil seeds and flax. In the vicinity of 's-Hertogenbosch, in particular, the hop culture appeared on the scene, in addition to what happened in the adjacent districts of the Land van Heusden and Altena and parts of the river clay area, the Betuwe. Here farmers responded to the demand for hop not only from the towns in the district but also from the beer brewing industries in Holland.

¹¹³ Schepers and Jans, 'Balken und Deelen', 1970, p. 329.

¹¹⁴ Bieleman, 'De verscheidenheid', 1990.

¹¹⁵ Lindemans, 'Geschiedenis van de landbouw', vol. I, 1952, p. 426; Kappelhof, 'De hoeven', 1984, pp. 96-97.

¹¹⁶ Van der Wee, 'The growth', vol I, 1963, p. 210; Adriaenssen, 'Hilvarenbeek', 1987, pp 95-98.

¹¹⁷ Lindemans, 'Geschiedenis van de landbouw', vol. I, 1952, p. 427.

1.3. Farming in the interior provinces

The introduction of a system of (permanent) stall feeding was part of a process in which the production of manure became one of the main activities on the farms. The attention manure production and preparation gained in the prevailing farming system also had consequences for the farm buildings. After the early 17th century the aisle of a traditional *halle-huis*, a farmstead type that prevailed in a large part of the Netherlands and which was normally used as a threshing floor, was converted into a deep pit stall. There the animal droppings were mixed with all kinds of organic matter, like sods of heather, to be composted under the stock's hooves into manure. Once a year this mixture, known as *plaggenmest* (*plaggen* = sods; *mest* = manure), was dug out and brought out into the field.

In time, as this earth-rich mixture was brought onto the arable, the latter became covered in a thick layer of dark brown or black, humic raised topsoil (up to 1.20 meter or more) that soil scientists refer to as *oude bouwlandgronden* (old arable soils) or *plaggenbodems* (sods soils) and that should be seen as a typical man-made soil type. Strikingly, the relative area covered with this soil type is much larger in Noord-Brabant than it is in the Eastern and North-eastern sandy districts in the Netherlands.

In Brabant, these man-made *plaggenbodems* or sod soils cover about one third of the total area of sandy soils, while in the other provinces this share usually hardly exceeds 10% (Table 1.6).¹¹⁸ This should be seen as typical for the highly labour-intensive character of the farming system combined with a higher population density of the Noord-Brabant sandy districts compared with those of the other sandy districts in the Netherlands.

Table 1.6. The area of man-made *plaggenbodems* in relation to the total area of sandy soils, in 6 provinces.

	Total area of sandy soils in hectares	The area of <i>plaggenbodems</i> in hectares	
		abs.	in %
Drenthe	186,300	16,600	8.9
Overijssel	243,800	11,700	4.8
Gelderland	304,900	33,000	10.8
Utrecht	48,300	5,800	12.0
Noord-Brabant	344,000	109,900	31.9
Limburg	102,000	15,200	14.9
The Netherlands	1,411,800	195,200	13.8

Source: 'De bodem van Nederland', 1965, Annex 3, Table 35.

¹¹⁸ 'De bodem van Nederland', 1965; see also: De Bakker, 'Major soils and soil districts', 1979.

It is clear that during the ‘long 16th century’ farming in the different sandy provinces of the northern Netherlands also underwent a period of great changes, each district following its own course. And emphasising a major contrast in the way things developed in the coastal provinces as opposed to the situation here – as earlier generations of historians used to do – does indeed detract from the importance of what occurred in the sandy districts. Of course, farming in Holland, Zeeland and Friesland was peerless in every respect, especially when seen from a wider perspective. Yet the situations in the interior provinces were not undeveloped or backward in comparison to what happened in the coastal provinces, merely different and in many ways much more generally ‘European’.¹¹⁹

¹¹⁹ Bieleman, ‘De verscheidenheid van de landbouw’, 1990, pp. 537-552.

Part 2 – The period 1650-1850
**Contraction and expansion – Farming on the eve of
the Industrial Revolution**

2.1. Introduction

About halfway through the 17th century, after a long serried era of economic expansion Europe encountered a period of economic stagnation which would last for about one hundred years. Here earlier, there later, population growth stagnated and even declined. Around 1600 Europe's population had increased to 78 million people and approximately one hundred years later this number had hardly risen at all.¹²⁰

It would seem that population developments in the Netherlands followed a similar trend. In parts of the coastal provinces population growth stopped and declined and sometimes it even decreased drastically, especially in the Zuiderzee towns and in some of the traditional 'industrial' centres. In the northern part of the province of Holland, for instance, population numbers fell from 211,000 to only 128,000. And on the other side of the Zuiderzee, in Friesland, the number of inhabitants decreased from 160,000 in 1660 to 135,000 in 1744.¹²¹ However, although Dutch population growth as a whole stagnated, it was certainly not an overall phenomenon. On the contrary in the interior country the population grew, although not equally rapidly in every region. In Overijssel, for instance, population numbers increased from 71,000 in 1675 to 122,400 in 1748. Yet, it appeared to be an increase mainly on the margins of rural society. While the numbers of large, settled farmers remained steady, the numbers of cottagers and land labourers more than doubled.¹²² A similar trend occurred in the adjacent province of Drenthe.¹²³

As population growth slowed down, the demand for agricultural products decreased and prices fell. Interrupted by a few short periods of recovery – usually during some war periods – the downward movement of prices continued until about 1750. It is generally assumed that prices of livestock products initially managed to hold their own quite well. In the long term, however, they also decreased. Yet, the prices of some non-food crops like flax, coleseed and madder fell less sharply than grain prices. The results in farming, however, did not solely depend on revenues – and therefore prices. They were also determined by the various costs farmers had to incur, such as wages, polder levees, and all kind of tithes and taxes. And, unfortunately, while prices, and so the farmers' income declined, these expenses tended to increase in time, landing many of them in financial trouble. In general, rents did follow the declining trend of the economy, yet the land labourers' wages did not, and therefore became an increasing burden. The same was true for the polder levees. The costs of water management were rather inflexible and hence they became – relatively, if not absolute – an increasing burden. From the year 1731 in particular, when the shipworm arrived in Dutch waters and ate away the wooden parts of the seawalls and sluices, large sums of money had to be invested in reconstruction, and these had to be paid by the joint landholders. The total

¹²⁰ This figure includes 16 Northwest-, Central-, Mediterranean- and East-European countries. De Vries, 'European urbanization', 1984, Table 3.6.

¹²¹ Van der Woude, 'Demografische ontwikkelingen', 1980, pp. 129-131; Schuurman, 'Historische demografie', 1991, pp. 16-22.

¹²² Slicher van Bath, 'Een samenleving onder spanning', 1957, pp. 478-480.

¹²³ Bieleman, 'Boeren op het Drentse zand', 1987, pp. 127ff.

cost of repairing the sea dike around the Westfriesland region in the province of Noord-Holland, for instance, amounted to the then gigantic sum of 5 million guilders.¹²⁴ And, although for different reasons, the costs of water management in the westernmost parts of Zeelandic Flanders increased as well and landholders had to pay polder charges that were five times what they used to be. The latter increased from 1.36 guilders/ha in 1660 to 6.78 guilders/ha in 1720 and remained at that level until the 1760's.¹²⁵

Probably even more serious than these expenses, however, was the increasing burden of taxes Dutch citizens had to pay to finance the governmental costs of the wars the young Republic got involved in. Of course, Holland was the province that contributed most, but it is clear that the inland provinces also had to pay an increasing contribution to the nation's war efforts. The total income from taxes in the Meierij region in the province of Brabant, for instance, converted into the equivalent quantity of butter, appeared to have been two thirds higher (or more) in the period 1690-1730 than it had been around 1650.¹²⁶ Expressed in the equivalent quantity of rye (their cash crop), farmers in Drenthe had to remit four times their normal contribution to Den Haag.¹²⁷ And in Overijssel the situation was much the same. So in the time of two generations, farm households were confronted with continually rising costs, caused by increasing fiscal charges. And insofar as the spiralling prices of their products might have been veiled for them by the usually strong annual fluctuations, farmers must have suffered from the increasing taxation, which caused an enormous increase in their expenses.

As a result, complaints could be heard everywhere about tenant farmers with massive rent arrears, causing them to get into deep and long-lasting debt. In some cases, for example, the tenants of the Twickel manor near the town of Delden, in the sandy part of Overijssel, they tried to curb their tenancy debts by doing all kinds of jobs for their landlord like spinning, making bricks, etc. They supplied him with butter, rye and barley, manure, pigs and hams. However, in spite of these deliveries, their arrears remained and even as late as 1800 it was reported that this 'practice has almost turned into bylaw as it meant that a farmer is usually one year in arrears'.¹²⁸

The declining economy and falling profitability of farming also drastically effected reduced land reclamation activities in the coastal provinces. In the province of Zeeland, for instance, the area of diked land had been expanded by about 50% until 1680, when it stagnated or even declined slightly and only increased again significantly after 1770.¹²⁹

The scissor-like movement of falling prices and rising costs did not imply, however, that farming itself fell back into less developed ways. The period of economic contraction that came about after 1650 was in this sense not simply the reverse of what happened during the economic expansion in the preceding era. Dutch farming was known for its high standards

¹²⁴ Baars, 'De paalwormfurie', 1988; *idem*, 'Het dijkherstel', 1989; *idem*, 'Herstel van de paalwormschade', 1989; *idem*, 'Paalwormschade', 1989.

¹²⁵ Van Cruyningen, 'Behoudend maar buigzaam', 2000, p. 85.

¹²⁶ Kappelhof, 'De belastingheffing', 1986, especially pp. 283-285, Table 11.

¹²⁷ Bieleman, 'Boeren op het Drentse zand', 1987, pp. 172-179.

¹²⁸ Van Zanden, 'De opkomst', 1984, pp. 120-121.

¹²⁹ Priester, 'Geschiedenis van de Zeeuwse landbouw', 1998, pp. 31-37 and annex B.1.

and it would remain that way. However, as the situation worsened farmers were forced to make adjustments in farm management to cope with the economic problems. And roughly speaking, they had two different strategies at their disposal. Firstly, they could try to minimise their costs, aiming to balance farm revenues and expenditures. In the coastal provinces particularly, where farming involved a lot of – expensive – hired labour, farmers tried to cut these costs by making savings on labour, which resulted in a process of extensification. In the inland provinces, however, hired labour was less important and it was cheaper anyway. Therefore, farmers here could try to increase their production by using more hired labour or simply working harder themselves in order to bring their revenues in line with their expenditures. Moreover, and unlike the situation in most parts of the coastal provinces, farming systems in the interior usually offered opportunities to do so. Consequently, these farmers were inclined to introduce all kinds of innovations, which, on a balance, raised farming to a higher level and generally resulted in a trend of intensification.

When the economic situation gradually worsened after 1650, the Dutch government tried to face up to the problems by setting out a deliberate commercial policy. To help the livestock farmers, for instance, it introduced a system of customs duties on the imports of cheese, butter, cattle and meat, while exports of these products were liberalised.¹³⁰ As far as arable farming was concerned, Den Haag (or the States General) steered a middle course between the interests of an arable farming province like Zeeland (which had asked for an import levy on grain) and those of the trading centres like the city of Amsterdam, and therefore the interests of the province of Holland (which saw a levy as a threat to their trade business).¹³¹



Of course, the outlines given above are sketchy and hardly do justice to the often far more complicated historical reality. Yet, it is clear that in this period of decline many innovations in farming emerged as an answer to the worsening economy and formed an important basis for the changes that came about after the middle of the 18th century when the economic situation slowly recovered again. In fact, seen from a more abstract perspective, the moment at which prices began to increase again after 1750 marked the emergence of a process of complex and fundamental changes in European society, which has become known as the Industrial Revolution. Roughly speaking, one could say that these changes marked the transition from the old, agrarian society to the new, industrial era. From this moment on, the urban sector would rapidly exceed the rural sector in numbers.

In general, it seems that agriculture was finally able to sustain this expanding urban sector as the result of the introduction of a number of fundamental innovations. On a European scale new crops and new improved implements (such as better and more effective types of ploughs) and farming methods (row cropping) helped to increase production. One of the

¹³⁰ Verviers, 'De Nederlandse handelspolitiek', s.a., pp. 117ff.

¹³¹ Faber, 'Graanhandel', 1961.

Part 2 – The period 1650-1850

most important innovations that spread around was the introduction of red clover in arable farming, which raised nitrogen levels, so boosting productivity (Table 2.1).¹³²

Another decisive improvement which had an enormous impact was the spread of the potato leading to a fundamental change in the menu of many Europeans. Potatoes not only allowed more people to live from the same area of farming land, they also hailed a structural improvement in their state of health because of the vitamin C content. Furthermore, potato cultivation required only simple implements: a spade or a hoe would do. It was these qualities that represented the crop's popularity, but also its danger.¹³³

In many ways it seems that the classical Malthusian ceiling that had ruled the old agrarian society in Europe for ages, had been broken through, or at least shifted to a higher level out of sight, at least for the time being.¹³⁴ Typically, the enormous fluctuations in grain prices that were so characteristic of the old agrarian era were gradually getting smaller. And although the potato blight or phytophthora (caused by *Phytophthora infestans*, a fungus), which appeared for the first time in 1845, had disastrous consequences for many Europeans, it was in many ways the last subsistence crisis this part of the world had to go through.¹³⁵

After 1750, a renewed and accelerating growth in the European population caused a rising demand for agricultural products again. This, in turn, induced an increase in prices, making farming increasingly profitable once more. Seen on a national scale, the recovering price level enabled farmers to develop innovations that had been introduced earlier. Especially in the Batavian/French period, that is from 1795 until 1813, prices went up sky-high.

Table 2.1. Nitrogen supply in north-western European arable farming, in kg/ha of arable land.

	c. 1770	1880
Seed	1.8	2.1
Farmyard manure	8.3	17.4
Legume residues	-	5.7-8.2
Other biological fixation	16.0	16.0
Atmospheric fixation	3.5	4.5
Commercial fertiliser	-	1.0
Total	29.6	46.7-49.2

Source: Chorley, 'The agricultural revolution', 1981.

¹³² Chorley, 'The agricultural revolution', 1981.

¹³³ Evans, 'Feeding the ten billion', 1998, pp. 78-80.

¹³⁴ Schuurman, 'Historische demografie', 1991, pp. 18-20.

¹³⁵ Zadoks, 'On the political economy of plant disease epidemics', 2008.

However soon after the French Empire had collapsed, prices fell again. In particular grain prices, as an increasing flow of grain from the southern parts of Russia and the Ukraine flooded European markets. And for many decades into the 19th century these vast regions became the granary of western Europe. As a consequence prices dropped, especially after 1818, and remained low until the 1830's. The result was a crisis, especially in the arable farming sector. Large numbers of farm labourers lost their jobs and the situation was exacerbated by the fact that the Dutch urban sector was still in decline and therefore not capable of absorbing this discharge of labour from the rural sector.

The combination of a rapidly increasing rural population, a (relative) decline in the urban sector and stagnating (or even declining) employment in the rural sector led to the emergence of fairly extensive unemployment in a number of regions. So, the first half of the 19th century also elsewhere led to a situation of increasing impoverishment. Never before in history had the Netherlands counted so many poor and needy people as it did in the years 1845-47 when the potato blight struck the country.¹³⁶

For the same reason, livestock farming had to cope with a stagnating demand on the home market as the consumption of meat and dairy products declined. Yet, on the whole the sector did not do too badly, as livestock farmers were already benefiting from an increasing demand for their products, coming from the other side of the North Sea where Britain was rapidly industrialising. As a consequence, dairy prices kept up fairly well between 1818 and 1840. For instance, in the years 1821-30 while the price of rye fell to 57% of its former level of 1806-15, butter prices had even risen slightly by 3%. It was a clear symptom of the slowly changing agro-economic relations in western Europe and these were only a prelude of things still to come after 1850, leading Dutch agriculture to far-reaching changes at that time.

For the time being, however, the Dutch economy still retained a strong agricultural character as the census of 1849 made clear when it revealed that 44% of the working population was still involved in agriculture. It was a situation quite similar to that elsewhere in the western parts of the European continent at the time, except for Britain of course.

¹³⁶ Terlouw, 'De aardappelziekte in Nederland', 1971; Bergman, 'The potato blight in the Netherlands', 1967; Van Zanden, 'De economische ontwikkeling', 1985, pp. 204ff.

2.2. Arable (and mixed) farming in the marine clay districts

Shortly after 1650, the arable farming sector was the first to face the scissor-like movement of falling prices and increasing costs. After all, the long-lasting depression began with declining grain prices. In the years 1681-90 the price of wheat in an important regional market like that of Dordrecht had fallen to 60% of the level around 1650.¹³⁷ Yet, there were some short periods of recovery, which largely coincided with the Nine-Years War (1688-97), the Spanish Succession War (1701-13) and the Nordic War (1701-21). In the long term, however, the declining trend in prices continued until its nadir around 1730.

Added to that, arable farming, which was still very much a mixed type of farming, suffered from the rinderpest or cattle plague (*runderpest*), which is usually rated as one of the most catastrophic events in the history of agriculture.¹³⁸ This very contagious disease ravaged the Netherlands in the 18th century in three successive waves, i.e. in the periods 1713-20, 1744-65 and again in 1768-86. Although the cattle plague, albeit disastrous, did not have the same impact on arable farming as on the livestock farming sector, great numbers of cattle succumbed and caused an imbalance in farm practice.

As the secular recession evolved arable farmers were usually able to be more flexible than the highly specialised dairy farmers. By shifting the emphasis of rotation systems, for instance, they could try to avoid a price decline, which did not usually occur among different crops simultaneously. It was also important for them that in the long term non-food crop prices kept up better than grain prices. Therefore, farmers would try and extend the area under these crops as much as possible, although they were soon confronted with the limits of what was ecologically sound.

During the secular depression arable farmers, especially those on the larger farms, tried to curb their farming costs by reducing labour costs as they tried to minimize labour input; in other words by extensification. They could do so by re-organising their farm activities or choosing cheaper forms of labour (Box 2.1). Another common trend was to enlarge their farms. The characteristically large farms, the *heerden*, in the Oldambt district in the north of the province of Groningen, for instance, originated in this period through the joining of two or three smaller farms that had had to cease operating.¹³⁹ The same occurred in the western part of the Zeelandic Flanders district. There also it was the small and middle-size farmers that were unable to cope with the declining economic situation and had to quit. Farms with 10-30 ha of land were particularly badly hit as the situation worsened. And while the number of middle-size farmers was decimated, the number of large ones increased (compare Table 2.2). These large farms had the benefit of lower costs per ha, as they could manage with proportionally fewer horses and workers. Moreover, these large farms usually had greater economic resistance because of their greater financial means. In addition, they were less dependent on the intermediate trade as they organised and controlled the sales

¹³⁷ Priester, 'Geschiedenis van de Zeeuwse landbouw', 1998, pp. 676-683 (annex H.8).

¹³⁸ Faber, 'Cattle plague in the Netherlands', 1962; Buisman, 'Tussen vroomheid en Verlichting', 1992.

¹³⁹ Hoppenbrouwers, 'Grondgebruik', 1991, pp. 84-85; Knottnerus, 'Het Land Kanaän', 1991, p. 45.

Box 2.1. Harvesting with a short scythe or with a sickle?

A remarkable difference between arable farming in the northern marine clay districts and in the south-western delta occurred in the way farmers cut or mowed their grain harvest. In the north they mostly used a short scythe (*zicht*), while in the southwest farmers used a sickle (*sikkel*). The use of the latter was, again, typical of the labour intensive character of farming in that region. With the short scythe a cutter was able to mow an area of land one and a half times larger than with a sickle. The larger working capacity of the short scythe stemmed from its size: it has a much longer helve (c. 50 cm) and a longer knife (c. 70 cm) than the sickle. The size of the sickle and its weight, however, meant that only strong and skilled men could manipulate it. The much smaller and lighter sickle, on the other hand, could be handled by men, women *and* children.

Yet, it was heavy work. When using a sickle, workers had to stand in a bowed position. The cutter, being right handed, took the stalks together with his left hand, to cut them at about 20 cm from the ground. The mower with a short scythe, by contrast, was standing upright. He kept his short scythe in his right hand making swaying, chopping movements with it. In his left hand the mower had a picker: a short, straight helve, enabling him to gather the stalks together or, when the crop was lodging down, to pull them up a little. To cut off a whole sheaf, a cutter had to making a swaying, chopping movement 4 or 5 times as he walked across the field. The stubble he left behind in the process was much shorter than that on a plot of land harvested with the help of a sickle.

The reason why farmers in the southwest stuck to the sickle to cut their crop could have been that by doing so and cutting the stalk relatively high they got fewer weeds and weed seeds in their harvest once it was threshed. In Zeeland in particular, where they had set themselves the task of producing high-grade wheat, this was a very important part of the production process. Moreover, the use of the sickle caused less seed loss.

(Source: Priester, 'Geschiedenis van de Zeeuwse landbouw', 1998, p. 233; Van Cruyningen, 'Behoudend maar buigzaam', 2000, p. 168; also: Voskuil, 'De sikkel, de zeis of de zicht', 1972).

of their products themselves and they were able to retain their products to sell them at an advantageous, opportune moment.¹⁴⁰ Thus, by the end of the 18th century a class of large farmers had arisen, which until the middle of the 20th century dominated rural society both in Zeeland and Groningen.

As farmers had fewer opportunities to adapt their farming business, profitability fell (Figure 2.1). Using a fictitious farming model it is calculated that farming results in the newly reclaimed polders in Beijerlanden district, in Zuid-Holland, must have been in the negative

¹⁴⁰ Van Cruyningen, 'Behoudend maar buigzaam', 200, pp. 100-101; *idem*, 'Schone welbetimmerde hofsteden', 2002, pp. 44-46.

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Table 2.2. Farm size structure in the parishes of Cadzand and Groede in West-Zeeuws-Vlaanderen, in 1665-94 and 1748-49 in ha.

Farm size in ha	1665-94		1748-49	
	Number of holdings	in %	Number of holdings	in %
0-5	52	27	70	39
5-10	29	15	16	9
10-30	44	22	16	9
30-50	41	21	30	17
>50	30	15	46	26
Total	196	100	178	100

Source: Van Cruyningen, 'Behoudend maar buigzaam', 2000, p. 100 Table 4.2a and b.

for (almost) all the time from shortly after 1650 until 1765 (Figure 2.2).¹⁴¹ Although in many cases underhand arrangements were made between tenants and owners, resulting in lower rents in practice, many tenants went broke, especially in the first half of the 18th century. Far worse were the years 1712-39 (Table 2.3).¹⁴²

The same applied to farmers in the marine clay district of West Brabant. During the second half of the 18th century, as the economic situation began to improve again tenant farmers there still got a reduction in their contractually established rents if they paid off their old debts. It was a common phenomenon which indicates the great impoverishment amongst farmers caused by the length of the secular depression.

After 1750 prices improved again. And in many places developments occurred that indicated a renewed trend of intensification by deploying more labour and capital. After that came the French period which for arable farmers was a time of exceptionally high prices. It was thus all the more painful to experience the price fall shortly afterwards – from 1818 onwards – when grain prices in particular fell abruptly to a level even lower than in the 1770's. This price fall was caused by the sudden excess of grain on the European markets from the lately opened up grain-producing, fertile 'Black Earth' region in southern Russia and the Ukraine, after the end of the Napoleonic regime.

The malaise in arable farming that followed led to large numbers of unemployed land labourers. In 1822 the provincial government of Groningen discussed 'the poor conditions

¹⁴¹ Yet, farming results must have not as bad as this graph suggests. The agricultural historian Baars, who constructed it, assumed contractually fixed rents for one thing. However, in practice, they were not able to realise them and usually whole and corner arrangements were made between tenants and owners, which resulted in fact in less higher rents. Baars, 'De geschiedenis', 1973.

¹⁴² Baars, 'De geschiedenis', 1973, pp. 145-155, figure 65.

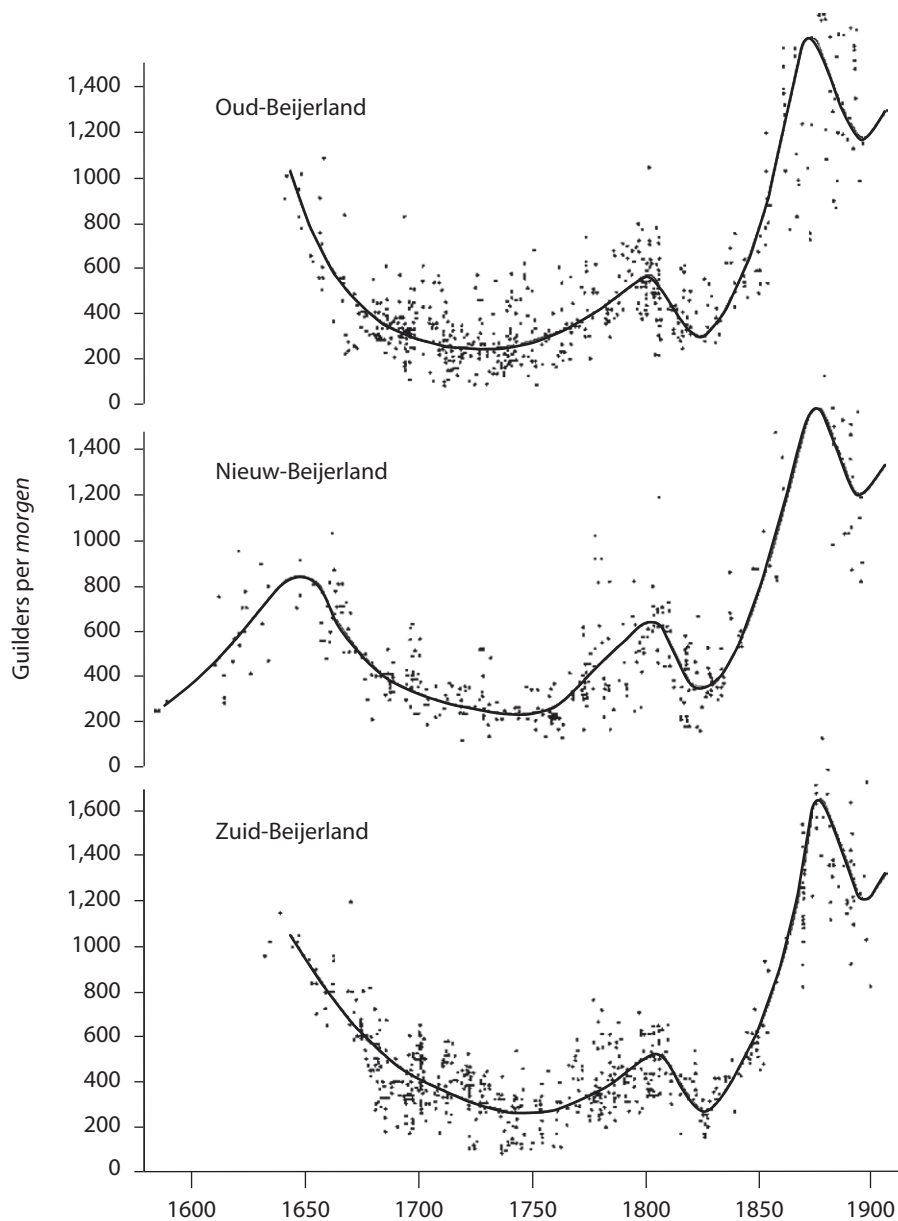


Figure 2.1. Land prices in the Beijerlanden region (southern part of the province of Holland) in the 17th, 18th and 19th centuries.

After: Baars, 'De geschiedenis', 1973, p. 112 Figure 47.

2.2. Arable (and mixed) farming in the marine clay districts

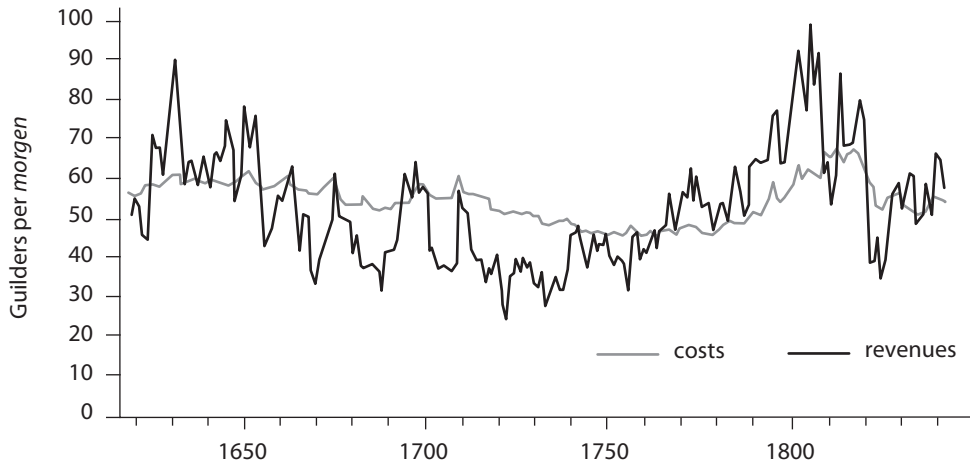


Figure 2.2. Revenues and farming costs in guilders per morgen (= 0.99 ha) according a fictitious farm model of 55 morgen in the Nieuw-Beijerland polder (province of Zuid-Holland), 1618-1841.

After: Baars, 'De geschiedenis', 1973, p. 199, fig. 75.

Table 2.3. The number of tenants ejected from their holdings as a result of rent debts in the Beijerlanden district (Zuid-Holland), 1601-1800.

	Number of ejected tenants		Number of ejected tenants
1601-1620	4	1701-1720	28
1621-1640	1	1721-1740	39
1641-1660	9	1741-1760	18
1661-1680	19	1761-1780	3
1681-1700	15	1781-1800	0

Source: Baars, 'De geschiedenis', 1973, p. 200 (Table 35).

amongst many of the land labourers and their families during the last winter as employment and wages decreased and others were simply dismissed as they were usually provided with labour by the farmers.¹⁴³ In 1823 large farmers in that province sent a request to the King pleading for the establishment of an import duty on grains and pulses. They were confronted

¹⁴³ Blink en Koenen, 'Algemeen overzicht', 1913, pp. 12-15; Van der Poel, 'De landbouw na 1800', 1976, pp. 516-517; *idem*, 'Landbouw in de Noordelijke Nederlanden', 1981, p. 170.

by drastically reduced revenues in relation to their mortgage obligations, contracted shortly before in years when prices had been high. In Zeeland the situation was much the same.



Farmers in the south-western marine clay district traditionally applied very complex crop rotation systems. Besides their cereals, like wheat and barley, they grew pulses (in particular beans) and several industrial, non-food crops. However, notwithstanding the intensive character of farming, they still worked their arable as a part of a mixed farming system, although cattle (and sheep) numbers were much smaller here than in the northern clay districts. The latter was largely to blame for the scarcity of fresh drinking water that made it difficult or even impossible to keep large stocks of cattle.¹⁴⁴

For centuries wheat had been the most important crop by far. Contemporary historians praised the Zeeland farmers because of the abundance of their crop yields and the quality of the product.¹⁴⁵ Their high productivity level was the result of the intensive and meticulous way farmers cared for their growing crops. They would plough up their fallow arable eight to eleven times, while fields in stubble preceding a subsequent year's wheat crop were ploughed another three to four times. Crops that were growing in advance of wheat were weeded more intensively than others and the wheat itself was often weeded with the help of a small implement, the *schrepel* (a short-handled weeding hoe). So, thanks also to the participation of numerous women and children, weeds could be successfully controlled. Farmers in Zeeland even enjoyed a sort of national reputation for their 'clean' fields. The famous 19th-century agronomist Staring wrote around 1870: 'nowhere in this country is better care taken in weeding than by the farmers in Zeeland'.¹⁴⁶

Traditionally, arable farmers in Zeeland in general followed a seven-year crop rotation system. This implied that after six years of all kinds of different crops the land remained fallow for a whole year. If in two of these six years the land was sown with wheat, this crop would cover on average one third of the total sown area. In some places, however, this area was significantly larger and the area under wheat could even be as large as 40% of the sown arable. This means that quite a few farmers grew wheat in three of their six-year rotations. In general, during the secular depression (and in fact through until the 19th century) the share of wheat in the total sown area in the south-westerly marine clay district remained as large as 35 to 45%.

Of course there were places where matters were very different. In the western part of Zeelandic Flanders, for instance, the share of wheat was relatively small initially; that is to say 24% of the arable in the period 1670-99. But during the depression the area under wheat increased at the cost of the area under barley and in 1780-95 it covered 30% of the arable,

¹⁴⁴ Priester, 'Geschiedenis van de Zeeuwse landbouw', 1998, pp. 37-41.

¹⁴⁵ *Ibidem*, pp. 285-286.

¹⁴⁶ Quoted by Priester, 'Geschiedenis van de Zeeuwse landbouw', 1998, p. 180.

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versus 16% of barley. Noteworthy was the share of pulses in this district that varied from 26 to 30% (Table 2.4).¹⁴⁷

Fundamentally different, however, was the way in which farmers on the island of Schouwen-Duiveland reacted to the secular contraction. They tried to find a way out by significantly reducing their area under wheat – up to as much as 25% – while expanding the area under madder. Around the middle of the 17th century the island was already considered to be the pre-eminent centre of madder cultivation in the area. Then, taken together with three other non-food crops (rapeseed, coleseed and flax), madder took about 15% of the area of tithable crops. After 1660, however, there was a short but sudden period of strong growth of the area under these four crops. And after the storm flood of 1682, when 161 of the polders in Zeeland were flooded, this share amounted to more than 20% for some time (Figure 2.3). A second spurt of growth followed between 1710 and 1730. After 1730 the share of these four crops together hovered around 35%, more than twice as much as during the first half of the 17th century. A true peak was the year 1779 when 50% of the area under tithable crops was sown with madder and other non-food crops.¹⁴⁸ And the enormous expansion of these crops occurred at the cost of the area under wheat.

Moreover, it appeared that the growth was much bigger even than these figures suggest. We know, for instance, that initially, in 1588, the share of madder of the total area of non-

Table 2.4. The relative crop assortment in West-Zeeuws-Vlaanderen in the period 1670-1795, in percentages of the area of arable land.

	1670-99	1700-19	1720-39	1740-59	1760-79	1780-95
Wheat	24	24	29	30	30	30
Rye	2	2	2	3	3	2
Barley	21	20	17	14	16	16
Oats	5	3	1	1	1	0
Pulses	27	26	27	28	30	28
Flax	4	4	3	1	0	1
Coleseed	2	4	4	4	2	5
Other ¹	2	2	2	3	2	2
Fallow	13	15	15	16	16	16
Total	100	100	100	100	100	100

¹Including: madder, potatoes, carrots and fodder crops.

Source: Van Cruyningen, 'Behoudend maar buigzaam', 2000, p. 131, Table 5.1.

¹⁴⁷ Van Cruyningen, 'Behoudend maar buigzaam', 2000, pp. 130-133, Table 5.1.

¹⁴⁸ Priester, 'Geschiedenis van de Zeeuwse landbouw', 1998, pp. 353-355.

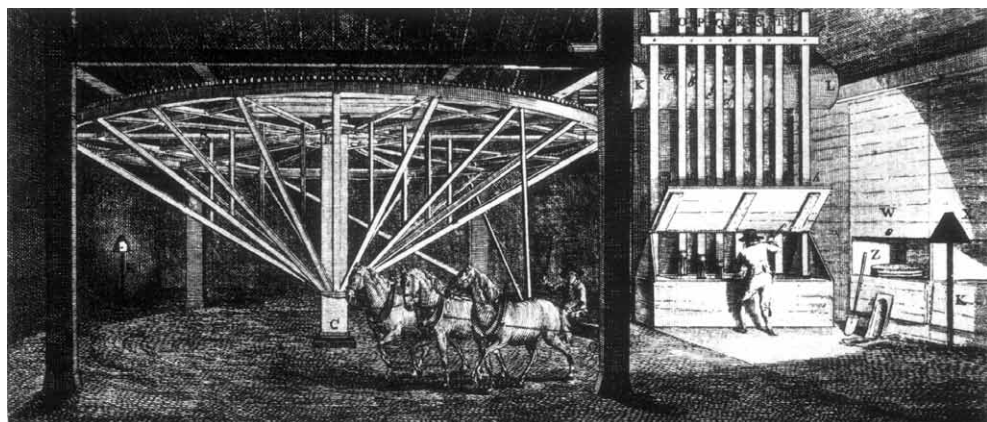
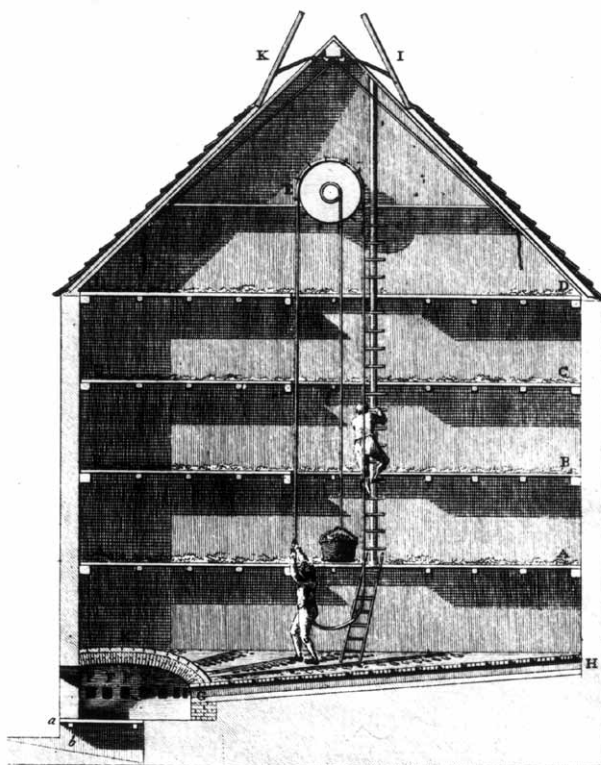


Illustration 2.1. The interior of a madder kiln or meestoof.

The upper picture shows a cross-section of the so-called warme stoof, the heated kiln. After having more or less dried naturally while in depot, the roots were brought into the heated kiln and spread over the various lofts. Bottom left in the heated kiln is the hearth. After being dried, 'threshed', and sifted the purified root parts, called racine, were dried again on an oast. Finally the racine was pulverized in a stamping device that was driven by a horse mill (lower picture). For various reasons the stamping was usually done at night. Source: De Kanter, 'De meekrapter en bereider', 1802.

2.2. Arable (and mixed) farming in the marine clay districts

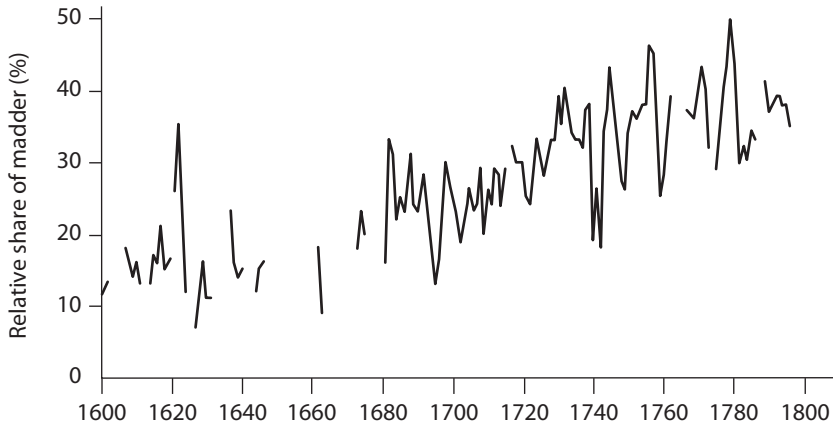


Figure 2.3. The relative share of madder (and 3 other non-food crops – rapeseed, coleseed and flax) in the total area of tithable¹ crops on the island of Schouwen (Zeeland) in percentages, 1600-1800.

The area under madder, however, must have increased even more than the curve suggests. From other sources it appears that the relative share of madder in the combined area of 4 non-food crops still amounted to as much as 29% in 1588 and increased to 77% in 1693. During the following century the replacement of rapeseed and coleseed by madder must have continued as by 1800 there was hardly any area of these oilseed crops left on Schouwen. After: Priester, *'Geschiedenis van de Zeeuwse landbouw'*, 1998, p. 353-355 and Table E.4.

¹ Tithable was all the arable except for the land under fallow or clover.

food crops amounted to only 29%. A relatively large area of these crops was taken up by 'round seed', that is to say coleseed or oilseed rape. Flax was hardly grown here on the island. In 1693, however, the share under madder had already increased to 77%. The large share of madder in that year occurred at the cost of the area under coleseed. The latter was difficult to combine with madder in one rotation cycle. Around 1800 hardly any coleseed was grown here on Schouwen-Duiveland. Farmers here did not reduce the expensive madder culture during the secular depression; on the contrary, they expanded it.

According to the 18th century English botanist and agronomist Philip Miller madder was cultivated all over the islands of Zeeland once every eight to ten years. On Schouwen-Duiveland, however, madder returned once every three of four years, alternating with grain and pulses.¹⁴⁹ Around the middle of the 18th century there were 19 to 20 madder kilns actively working on this island alone; in 1820 there were 21 of a total of 43 in the whole of the province of Zeeland. Madder cultivation on the outskirts of the south-western delta also increased in this period.

Remarkably, though, while madder cultivation was expanding, the physical yields of wheat were decreasing on Schouwen-Duiveland. During the first half of the 17th century

¹⁴⁹ Miller, 'The method of cultivating madder', 1758, p. 5; Boerendonk, 'Historische studie', 1938, p. 109.

these yields had fluctuated between 18 and 25 hl/ha, but afterwards they rested at a level ranging from 15 to 20 hl/ha – still a remarkable result.¹⁵⁰ It appears that farmers contented themselves with a somewhat lower yield of their wheat crop, if it meant a lower input of labour and therefore lower costs. At the same time it may have enabled them to reallocate the available labour in favour of more profitable crops like madder.

A major innovation in arable farming in the south-western marine clay district was the introduction and spread of potato (*Solanum tuberosum*) cultivation. The oldest traces of potato cropping in the Netherlands were found in the Cadzand region in the south-westernmost part of Zeeuws-Vlaanderen, in 1697 and in the Land van Cadzand (in the same district), around 1700. The Scotsman Belraven mentioned that during the Nine Years War (1688-97) farmers and soldiers encamped in the region did eat a lot of potatoes.¹⁵¹ Soon potatoes were cultivated not only in gardens but also in the arable and during the first decades of the 18th century the potato spread around very rapidly. In 1736 the provincial government of Zeeland determined that potatoes would be subject to tithe dues, which implies that potato culture had already reached a certain size at that time.¹⁵² Competing with the northern parts of Friesland the south-western marine clay district began supplying potatoes to the towns of the provinces of Holland and Zeeland.

What is striking, however, is that in the 1720's and 1730's potato cultivation on the large farms in the Beijerlanden district (south of Rotterdam) was still a minor activity. It was not until after the severe winter of 1739-40 that the crop gained importance and not until after 1755 that the area planted with potatoes rapidly expanded here. In the West-Brabant marine clay region, on the Nassau demesne farms, one farmer introduced the crop, planting only a small plot (0.65 ha) in 1739. However, 20 years later, in 1759, nine growers with a total of 13 ha under potatoes were registered.¹⁵³

As with flax cultivation the labour-intensive cultivation of potatoes was left to specialised potato growers. They rented plant-ready land from the regular farmers to grow potato for just one year.¹⁵⁴

Yet, all this does not mean that the potato began its conquest of the Northern Netherlands here in the southwest. In the eastern part of the river clay district too, in the province of Gelderland, the cultivation of potatoes was already recorded as early as in 1699.¹⁵⁵ This implies that the spread of potato cultivation in the Netherlands occurred much more erratically than historians formerly believed.

According to the current view people learned to eat potatoes out of sheer necessity after grain prices sky-rocketed during the severe winter of 1739-40. Yet it is clear that even before 1740 the potato was gaining ground as the staple food in the poorer parts of the rural Dutch

¹⁵⁰ Priester, 'Geschiedenis van de Zeeuwse landbouw', 1998, pp. 285-293.

¹⁵¹ Slicher van Bath, 'De agrarische geschiedenis', 1960, p. 293; see also: Verhulst, 'Precis d'histoire rurale', 1990, pp. 169-172.

¹⁵² Verhulst, 'Precis d'histoire rurale', 1991, p. 170.

¹⁵³ Dewez, W.J., 'De landbouw in Brabants Westhoek', 1958, pp. 15-16.

¹⁵⁴ Baars, 'De geschiedenis', 1973, pp. 136-137.

¹⁵⁵ Roessingh, 'Het begin', 1976.

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population. To the ‘common man’ the potato meant an essential improvement in his daily diet and, moreover, he did not need a horse and plough to grow potatoes; a spade would do. However, for larger farmers the potato also meant a good and cheap source of food for his own household. Technically the crop was important as it helped the farmer in his everlasting fight against weeds. It seems, however, that in the province of Holland in particular potatoes displaced not so much bread from the daily menu, as pulses and root vegetables as well. Elsewhere, though, the new crop also substituted bread to a great extent.¹⁵⁶



Aiming for a more cost-effective system, farmers tried to cut their costs by looking for ways to organise their supply of labour differently. On larger farms in particular many activities were increasingly contracted out to groups of specialised workers. For instance, the digging of madder in the autumn – an arduous and specialised job – was contracted to groups of diggers led by foremen, as contracted work. Sometimes, farmers sold the crop while it was still in the field – unharvested – to avoid having to pay the costs of harvesting.¹⁵⁷

In the flax culture as well, the actual work was increasingly left to *vlassers*. These specialised flax farmers rented ready-for-sowing land from large farmers when it fitted in with their crop rotation. Many of these flax farmers came from the Hoekse Waard, de Zwijsdrechtse Waard and from the island of IJsselmonde, parts of the province of Zuid-Holland. In time, towns like Ridderkerk and Hendrik Ido Ambacht were to become true flax centres, where flax from far and near was processed.¹⁵⁸ During the last decades of the 18th century, flax from the then recently reclaimed lakes, the *droogmakerijen*, in Zuid-Holland was also brought to these centres, to be processed.¹⁵⁹ After the middle of the 18th century the economic situation in flax cultivation improved again and in the 1780’s it was said that flax growing was ‘booming business providing labour to so many hands as it had never done before in these lands’.¹⁶⁰

Share cropping became common practice in onion growing as well. Land labourers did the actual field work for one third or two fifths of the revenue, as the costs of seed and manure had been subtracted in advance. Sharecroppers in flax or onion growing usually worked with their whole family and were willing to work harder in exchange for a relatively small increase in money.¹⁶¹

Besides all kinds of adaptations and changes and in spite of the depression a number of technical innovations came to fruition during the depression. For instance, the introduction of new types of ploughs with a much more efficient mouldboard represented a major step

¹⁵⁶ Van der Woude, ‘De consumptie’, 1963. Compare also: Van der Maas and Noordegraaf, ‘Smakelijk eten’, 1983.

¹⁵⁷ Wiskerke, ‘De geschiedenis van het meekrapbedrijf’, 1952, p. 79.

¹⁵⁸ Van Hertum, ‘Landbouwkundige beschrijving’, 1836, p. 197; Baars, ‘De geschiedenis’, 1973, pp. 135-136; Damsma and Noordegraaf, ‘Een vergeten plattelandsnijverheid’, 1982.

¹⁵⁹ Van Hertum, ‘Landbouwkundige beschrijving’, 1836; Blink, ‘De geschiedenis en de geografische verbreiding der vlascultuur en vlasindustrie’, pp. 281-282; Baars, ‘De geschiedenis’, 1973, pp. 135-136; Damsma and Noordegraaf, ‘Een vergeten plattelandsnijverheid’, 1982.

¹⁶⁰ Boerendonk, ‘Historische studie’, 1935, p. 32.

¹⁶¹ *Ibidem*, p. 82.

forward. In Zeeland the coulter and mouldboard of the traditional footplough¹⁶², the so-called *Duitse* plough (*Duits* not meaning ‘German’, but *Diets*, i.e. indigenous), acquired a new shape from the mid-17th century onwards. The old, straight and wooden mouldboard was replaced by a new bent and curved one. This greatly improved the turning and crumbling effect of the plough. Even more radical was the introduction of the so-called *Wale* or *Waalse* plough. Unlike the *Duitse* plough the *Wale* plough was a big, heavy gallows plough, especially suited for heavy and stubborn marine clay soils. The oldest known recording of this 200 kg weighing plough, which could plough more than 30 cm deep, is from a probate inventory from 1647. However, during the first half of the 18th century the number of these new types of ploughs increased rapidly. Then, an average farmer in the Zeeuws-Vlaanderen region would easily have about two *Waalse* and three or four *Duitse* ploughs.¹⁶³

In addition to this, there were a couple of true innovations in the form of new farming implements not known prior to 1650 and commonly used by the end of the 18th century, like the roller (*rolblok*) and the winnowing mill (Figure 2.4). The roller was a cylindrical

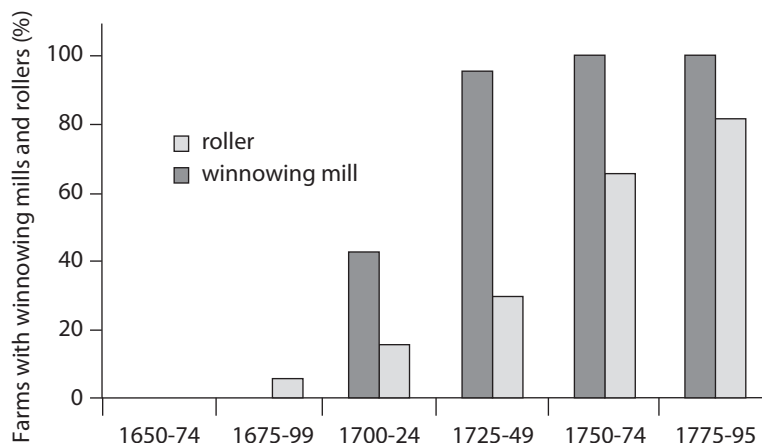


Figure 2.4. The presence of winnowing mills and rollers¹ on farms in Western Zeeuws-Vlaanderen (Zeeland). The relative number of probate inventories from this region mentioning a winnowing mill or a roller, 1650-1795.

After: Van Cruyningen, ‘Behoudend maar buigzaam’, 2000, p.165, Graph 5.5.

¹ A roller was a cylinder shaped block of wood or stone with a diameter of ca. 50 cm, fixed on a pivot in a chassis and pulled by a horse over newly ploughed land; it was meant to shatter clods, but even more to compact the top soil after the sowing.

¹⁶² A foot plough is a one-share type of swing plough of which the beam is supported by an adjustable dragfeet; a trussed-beam plough.

¹⁶³ It is believed that the *Waalse* plough was imported sometime in the 17th century by refugees from northern France. Van der Poel, ‘Oude Nederlandse ploegen’, 1967, p. 47ff; *idem*, ‘Honderd jaar landbouwmecanisatie’, 1967, pp. 16ff; Priester, ‘Geschiedenis van de Zeeuwse landbouw’, 1998, pp. 237-238; Van Cruyningen, ‘Behoudend maar buigzaam’, 2000, pp. 159-169.

2.2. Arable (and mixed) farming in the marine clay districts

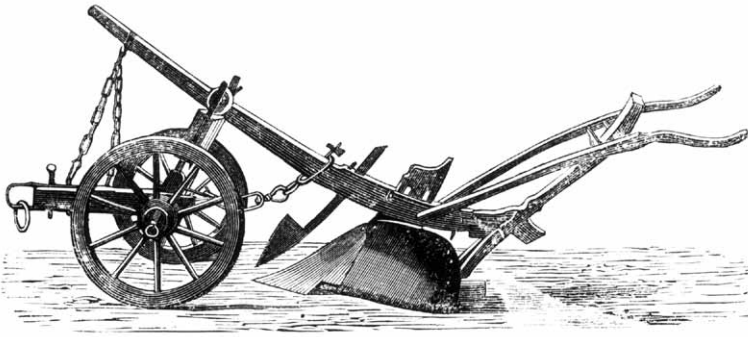


Illustration 2.2. The Wale- or Waalse-plough.

Without doubt, the Wale- or Waalse-plough was the biggest of all traditional plough types in the Netherlands. It weighed more than 200 kg. The leg of the plough was almost 3 metres long and the diameter of the biggest wheel was almost one metre. It was used on heavy marine clay soils in Zeeland and the western part of Noord-Brabant. Ploughing with this device demanded great skill. The first recording of this type of plough dates back to 1647, but from about 1700 onwards in particular it is mentioned more frequently. Source: Museum Historische Landbouwtechniek, Wageningen.



Illustration 2.3. The cleaning of threshed grain with the help of a winnowing mill (wanmolen) and a sieve.
Source: Drawing by Ids Wiersma, Museum Historische Landbouwtechniek, Wageningen.

block of wood or stone, fixed on a pivot in a chassis and pulled by a horse over newly ploughed land. It was designed to shatter the clods, but more importantly to compact the top soil after the sowing. At the end of the 18th century the vast majority of arable farmers had one of these at their disposal.

The winnowing mill (*wanmolen*) was pre-eminently an implement that enabled farmers to cut down labour costs. This piece of machinery, which came into use around 1700, was a wooden case inside which a large hand-driven paddle wheel rotated, generating a current of air that blew across the grain to remove chaff and dust. Earlier, newly threshed grain had to be cleaned by shaking and tossing it up in a winnow (*wan*), a big shallow basket which, of course, was very time and labour consuming. Later on the winnowing mill was improved with the installation of a number of different, shaking sieves.¹⁶⁴ It was remarkable how quickly the winnower was accepted, especially in the Zeeuws-Vlaanderen region. This was due to the fact that farmers in this region had set themselves the task of producing high-grade wheat and a winnower was essential for cleaning the grain.¹⁶⁵

After 1818 the abrupt fall in grain prices put an end to a long period of prosperity. Again the high labour costs caused great problems for farmers. However, besides the unfavourable course of the grain prices, the worsening situation concerning the madder culture worried them most. According to general expectations the grain trade would recover again in time and the coleseed and flax culture remained profitable after 1820.¹⁶⁶ Yet, for madder a more permanent peril threatened: the competition from French madder. The consequences of the French competition became particularly apparent after 1840. Technical developments in the cotton printing and dyeing industry were favourable for the French producers, as they had switched over to the industrial production of a madder preparation, called *garancine*. This preparation, introduced in 1826, had a three times more powerful dyeing effect than the traditional madder powder.¹⁶⁷ Yet, in the end the French competition caused no lasting damage. Although production of the classic madder powder did decline for some time after the 1830's, it appeared to be just a temporary regression.

An important innovation in madder production in Zeeland was the fact that madder merchants here began to produce *garancine* as well. And within just two decades these *garancine* factories took over a great deal of the production of the traditional madder kilns. As a result the exports of madder (*garancine*) to Britain increased again and the British soon obtained most of the product from this side of the North Sea. Around 1870 the total number of madder kilns and *garancine* factories amounted to at least 144. At least 77 of them were to be found in Zeeland (on the island of Schouwen-Duiveland 31), 30 in the province of Zuid-Holland and another 20 in western Brabant (Map 2.1).¹⁶⁸



¹⁶⁴ Van der Poel, 'Honderd jaar landbouwmechanisatie', 1967, pp. 42-44.

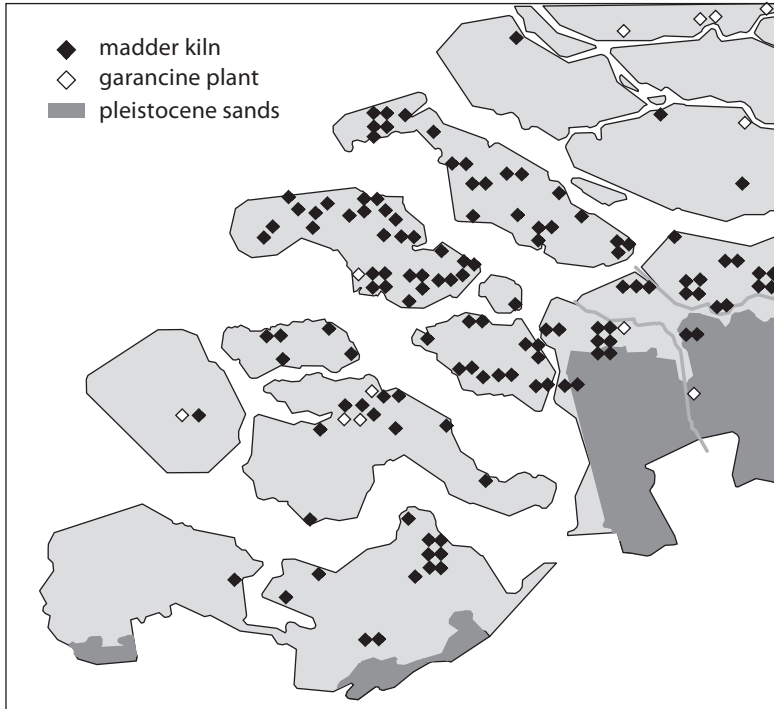
¹⁶⁵ Van Cruyningen, 'Behoudend maar buigzaam', 2000, pp. 164-166.

¹⁶⁶ Bouman, 'Geschiedenis', 1946, pp. 111ff.

¹⁶⁷ Schot, 'De meekrapnijverheid', 1986, pp. 49-52; Bouman, 'Geschiedenis', 1946, pp. 106-108; Wiskerke, 'De geschiedenis', 1952, p. 14.

¹⁶⁸ Wiskerke, 'De geschiedenis', 1952, pp. 28-30; Schot, 'Het meekrapbedrijf', 1987, pp. 106-107, reference 26.

2.2. Arable (and mixed) farming in the marine clay districts



Map 2.1. Madder kilns and garancine plants in the south-western delta region, around 1870.
After: Wiskerke, *'De geschiedenis'*, 1952; Schot, *'Het meekrapbedrijf'*, 1987, pp. 106-107, ref. 26.

In the northern marine clay district farmers also tried to cut back on labour. It stimulated the spread of a new piece of farming equipment: the threshing roll or threshing block for the threshing of grain – oats in particular. Soon afterwards the threshing roll was also introduced in other parts of the country.¹⁶⁹ The threshing roll was a wooden conical block, complete with ribs that weighed 500 to 1,000 kg. It was pulled around in a circle by one or two horses. Previously, the coleseed and grain had been spread out on the threshing room floor over the tread of the roll. Threshing with this piece of equipment saved a lot of labour, and now that his grain was ready for selling earlier than before the farmer could profit from the somewhat higher prices in the winter part of the year. Unlike the winnowing mill that was to be seen on all kinds of farms, large or small, the threshing roll was only adopted on large farms and in fact restricted to the arable districts of Groningen and Friesland.

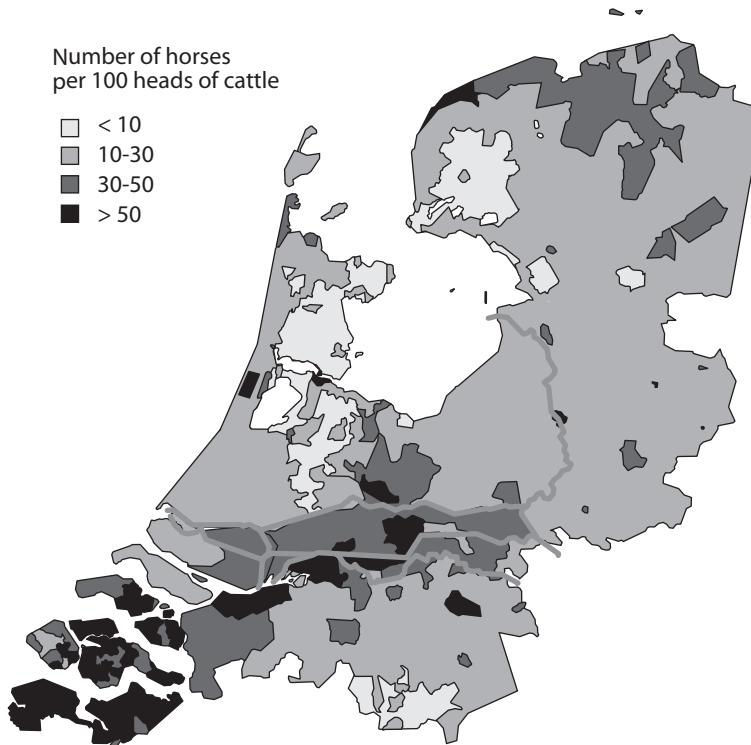
In general farmers here in the north tried to increase their production by lengthening their crop sequence cycle, so for instance a 6-year instead of 4-year rotation. At the same time spring sown crops remained more important here than in the southwest, while coleseed (together with rapeseed) was in fact their only non-food crop.

¹⁶⁹ Van der Poel, *'Honderd jaar landbouwmechanisatie'*, 1967, pp. 38-42.

Part 2 – The period 1650-1850

Furthermore, there was a tendency to extend the arable at the cost of the area under grass. The lighter, loamy or sandy clay soils were particularly suited for ploughing and using as arable. The spring sown crops that were cultivated could be brought to the market, but – and that was important – they could also be used on the farm itself to feed the livestock. Yet, these adoptions did not fundamentally change the farming system. In spite of the ploughing up of grassland the number of livestock was not reduced. On the contrary, stocks could be expanded. They kept on serving, however, the arable part of the farm being manure producers (Map 2.2).

However, the ploughing up of grassland was something that could easily go too far. Agricultural publicists in the 18th century did indeed argue that many Friesian farmers had too much arable land in relation to their area under grass and they were unable to work and manure it adequately. As a consequence, crop yields tended to decline. Although production



Map 2.2. The ratio between horses and cattle in 1811.

The number of horses per 100 heads of cattle (in livestock units, LSU's). The value's are based on figures per municipality, except for western Brabant (per canton), and parts of Zuid-Holland and Groningen (per district). Not included: Limburg. Source: Databank Rural History Group WUR.

2.2. Arable (and mixed) farming in the marine clay districts

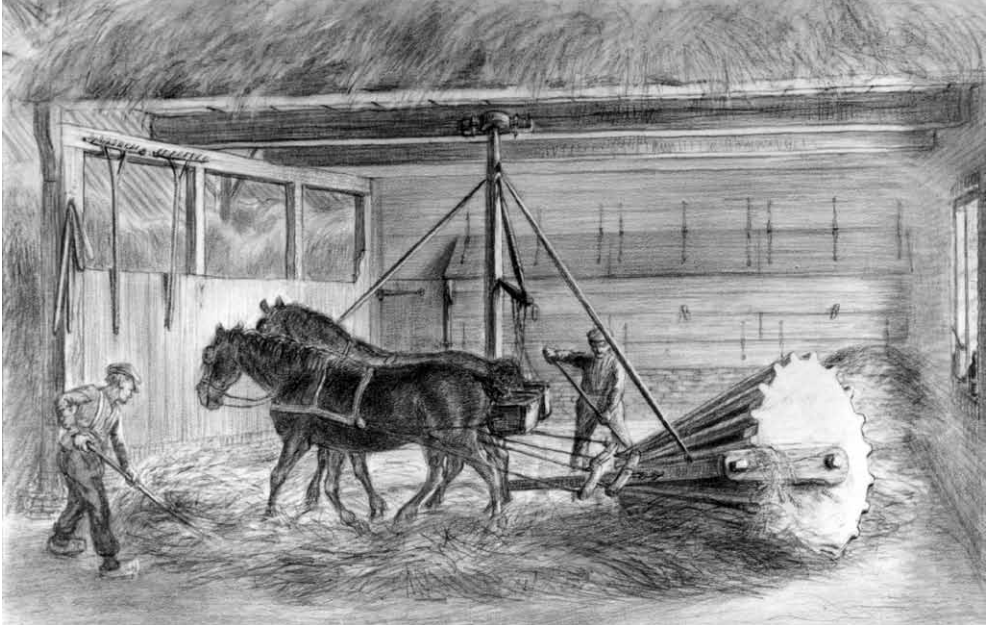


Illustration 2.4. Threshing roll or threshing block (dorsrol or dorsblok).

Ever since the beginning of the 18th century the use of the threshing roll or threshing block for threshing grain – and oats in particular – was widespread in the arable farming regions of the marine clay districts in the North. The threshing roll was a heavy wooden conical block that was pulled around in a circle by one or two horses. The introduction of the implement is a clear example of a cost-cutting innovation. Source: Collection Fries Museum, Leeuwarden.

per farm did increase in general – and that, of course was important during the depression – productivity improved only slightly or not at all.¹⁷⁰

However, to this end the introduction and spread of the culture of clover, in the course of the 18th century, represented an important improvement. Clover culture implied that a plot of arable land that had been sown with winter sown wheat, barley or rye in the autumn, was sown again in the spring with biennial red clover (*Trifolium pratense*). When, in the summer the protecting crop – the grain – had been harvested, a high-grade clover pasture remained. During the second year, however, the clover deteriorated, and was ploughed under to serve as green manure.

The significance of the clover culture lay to a great extent in the fact that clover hay with a very high fodder value (protein and calcium) could be produced. It allowed the farmer to keep a larger number of cattle in relation to his area of grassland, enabling him to manure his arable better. It was also significant that in the long term the crop improved the quality of arable. Being a leafy crop, clover also helped the farmer in his fight against weeds and once it was ploughed under it improved the structure of the topsoil. Even more essential,

¹⁷⁰ Faber, 'Drie eeuwen Friesland', 1972, pp. 191-208.

however, was the characteristic of clover to fix nitrogen from the air for plants to take up, leaving fertile arable behind, to a much greater extent than pulses or beans had done before. As a consequence, including clover in the crop sequence gave the farmer the opportunity to postpone the fallow year.

The first evidence of the clover culture in the north dates from the end of the 17th and the early 18th century. And it appears that this culture spread in particular after about 1735 across Friesland.¹⁷¹ Although Groningen seed merchants advertised for clover seed in the newspapers around 1750, it was not until the 19th century that the cultivation of clover spread in this province. Yet, around 1860 the share of clover in the total sown area in this province would be around 10%.¹⁷² This was indeed more than in Zeeland, but still rather meagre in comparison to – for instance – the English counties of Norfolk and Suffolk where the area of clover expanded from 8 to 20% of the area under crops between 1770 and 1836.¹⁷³ Incidentally, it is remarkable that clover cultivation in the south-western delta-region did not reach the same dimensions as here in the northern marine clay districts. This had probably a lot to do with the fact that, due to the lack of fresh water, the keeping of a larger number of livestock in Zeeland was limited and under these conditions the production of fodder on valuable arable land was pointless.¹⁷⁴

As the clover culture spread in the northern districts, so too did the cultivation of flax spread.¹⁷⁵ And in the process, especially in Friesland, the growing of flax was left to a category of small farmers, called *gardeniers* (compare with the English word: *gardener*) or *kooltjers* (literally: cabbage [*kool*] growers). To do so, these small farmers rented plots of arable land from larger farmers when it fitted in with the crop rotation of the latter.

After 1780, however, the area under flax was somewhat reduced here, in favour of the cultivation of potatoes, strongly influenced by the late 18th century price rises. Like flax, potatoes were also a typical *gardeniers* cultivation and they were also usually grown on plots of land of larger farms if it fitted in with their crop rotation. In a district like Barradeel this typical category of industrious workers grew fivefold in numbers between 1748 and 1796. In the latter year they together formed 60% of the total number of land users in this specific community.¹⁷⁶

So, potatoes became the major crop in the arable farming district of Northwest Friesland into the first half of the 19th century, and would remain so until 1845. In that year the potato blight or *phytophthora* also hit Dutch agriculture and destroyed the crops. In the north-western marine clay area were most of the commercial potatoes were grown, crops completely failed. And as potato prices rose sky high, the prices of other food crops followed. Both led to an acute impoverishment of larger parts of the population. In Friesland, for

¹⁷¹ *Ibidem*, p. 205

¹⁷² Priester, 'De economische ontwikkeling', 1991, p. 86.

¹⁷³ Overton, 'The determinants of crop yields', 1991, pp. 312-313.

¹⁷⁴ Priester, 'Geschiedenis van de Zeeuwse landbouw', 1998, pp. 198-204.

¹⁷⁵ Spahr van der Hoek, 'Geschiedenis', vol 1, 1952, p. 307.

¹⁷⁶ Faber, 'Drie eeuwen Friesland', 1972, pp. 184-185.

2.2. Arable (and mixed) farming in the marine clay districts

instance, the number of people who received poor relief increased to 19% in 1847.¹⁷⁷ Thereafter, the phytophthora disease ruled potato yields, especially on the clay soils. And it was not until around 1900 that yields again reached a level that matched those of the 1830's.

Another crop which became popular in the arable farming district of north-western Friesland in the last decades of the 18th century was chicory. As coffee had become ever more popular and its prices increased, many went in search of surrogates. One of the best proved to be the tap roots of the chicory plant (*Cichorium intibus*). The use of chicory as a coffee substitute was particularly stimulated during the French period when the price of coffee – which had become an everyman's drink – exploded. Although cultivated elsewhere as well (in parts of Zeeland, for instance) it became a typical product of the north Friesian arable farmers.¹⁷⁸ During the French period the whole of the Netherlands had as many as 84 chicory roasting houses in total; 62 (or 74%) of them were to be found in (northern) Friesland and another 13 in the other two northern provinces: Groningen and Drenthe.¹⁷⁹ In these small factories the tap roots of the crop were processed into chicory powder. The digging and harvesting, as well as the cleaning of the roots, demanded a lot of labour.¹⁸⁰ Chicory was therefore mostly cultivated on small-holdings or on detached land as a *gardeniers* crop.

As early as the 17th century the cultivation of coleseed had spread along the northern coastal area (compare Table 2.5). It was a particularly popular crop in the newly reclaimed marine clay polders along the coast, not least because of the abundant yields the lands in these new polders gave during the initial years. After the *Stadspolder* had been reclaimed from the former Dollard water in 1740, the first two successful crops were more than enough to recover the cost of the whole project.¹⁸¹ From the early 19th century onwards coleseed was increasingly cultivated in rows. And as row cropping indeed required more labour, it became possible now to reduce or even abrogate the area under fallow, which resulted – of course – in a much more intensified cropping system.

A remarkable, yet hardly studied phenomenon, was that by the mid-18th century the north-easternmost parishes of Friesland – nowadays a typical arable farming region – were known as 'the best cheese producing regions', producing full-cream cheese. Around 1750 about one million pounds of this cheese was brought to the market of the town of Dokkum, a quantity that fell back afterwards to virtually zero.¹⁸² Previously, many farms in this region had possessed cheese presses, indicating that cheese production really was an important part of their farming business. In the adjacent parts of the province of Groningen a similar trend can be perceived. After 1750, however, a shift in cattle keeping took place from cheese production to breeding and fattening, as arable farming also came to become more prominent.¹⁸³ Yet, arable farming kept a strongly mixed character until right into the 19th

¹⁷⁷ Bergman, 'The potato blight', 1967, p. 393.

¹⁷⁸ Faber, 'Drie eeuwen Friesland', 1972, pp. 188-189.

¹⁷⁹ D'Alphonse, 'Eenige hoofdstukken', 1900, p. 274.

¹⁸⁰ Spahr van der Hoek, 'Geschiedenis', vol. 1, 1952, p. 635.

¹⁸¹ Knottnerus, 'Het land Kanaän', 1991, p. 43.

¹⁸² Spahr van der Hoek, 'Geschiedenis', vol. 1, 1952, pp. 213-214; Hylkema, 'Leerboek', 1913, p. 626.

¹⁸³ Priester, 'De economische ontwikkeling', 1991, chapter 6.5.3 and reference 80.

Part 2 – The period 1650-1850

Table 2.5. The crop assortment in 14 municipalities in the Hunsingo district in the province of Groningen in 1862.

	hectare	%
Wheat	1,834	8
Rye	1,445	6
Winter sown barley	5,105	21
Spring sown barley	1,209	5
Oats	4,673	20
Beans	2,396	10
Read clover	1,373	6
White clover	629 ^a	3
Mangolds	356	1
Potatoes	515	2
Flax	88	0
Coleseed	4,319	18
Mustard seed	34	0
Total	23,976	100

^a Omitting the area under fallow.

Source: Heidema and Dijkema, 'Beschrijving van den landbouw', 1871, pp. 421-422.

century. The majority of products like grass, hay, fodder, pulses, straw and even grains were not brought to the market but remained on the farm. These 'internal supplies' were very important for feeding and caring for the livestock and consequently the maintenance of the fertility of the arable. The livestock density here in the north was therefore much higher than it was in the south-western delta.

During the last decades of the 18th century the improving economy, c.q. the improving profitability of farming, enabled farmers to raise the quality of their holding by making all kinds of investments.¹⁸⁴ An important improvement in the field of water management was the expansion of windmill drainage.¹⁸⁵ In 1851, an agricultural publicist from Groningen wrote: 'The construction of more and bigger drainage mills transformed this region, formerly a huge inland sea, into laughing fields of corn and lush pasture land'.¹⁸⁶ Before, the lower parts of the province of Groningen had looked like a large inland sea during the winter period, the result of an increasing flow of water coming from the upstream parts of the many

¹⁸⁴ Van der Poel, 'De landbouw na 1800', 1976, p. 514-515.

¹⁸⁵ Priester, 'De economische ontwikkeling', 1991, p. 278.

¹⁸⁶ 'De aanbouw van meer grote watermolens herschiep eene landstreek, eertijds aan eene barre zee gelijk, in lachende korenvelden en welige weiden.' Quoted by: Priester, 'De economische ontwikkeling', 1991, p. 278.

2.2. Arable (and mixed) farming in the marine clay districts

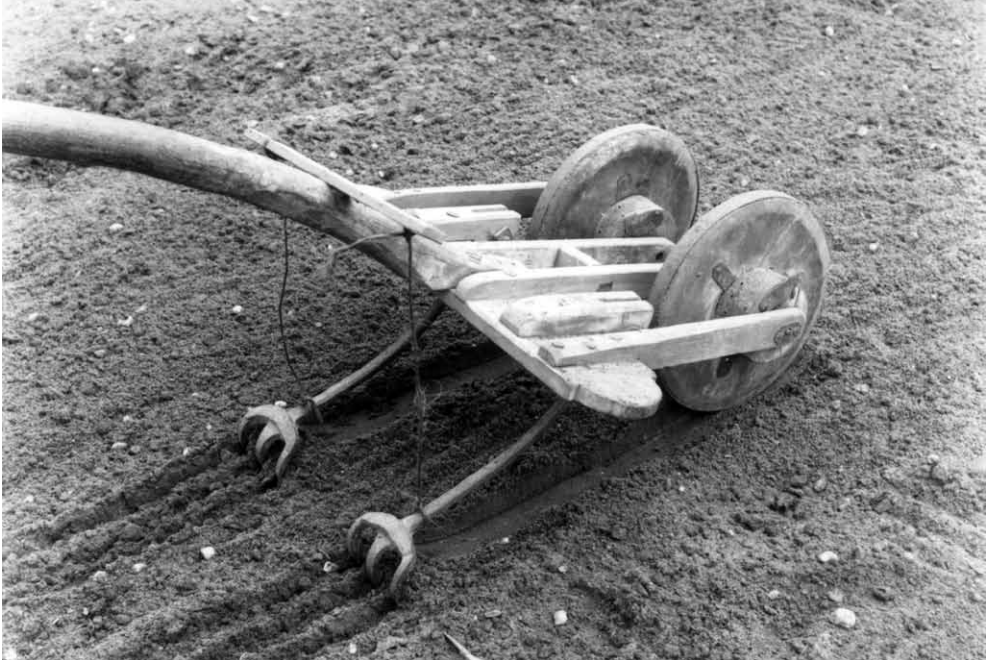


Illustration 2.5. A sùkerei-kroadtsje (a Frisian term for chicory wheelbarrow).

An implement that was introduced in the 18th century for row cropping of chicory in the northern parts of arable farming regions in Friesland and Groningen. Source: Nederlands Openluchtmuseum, Arnhem.

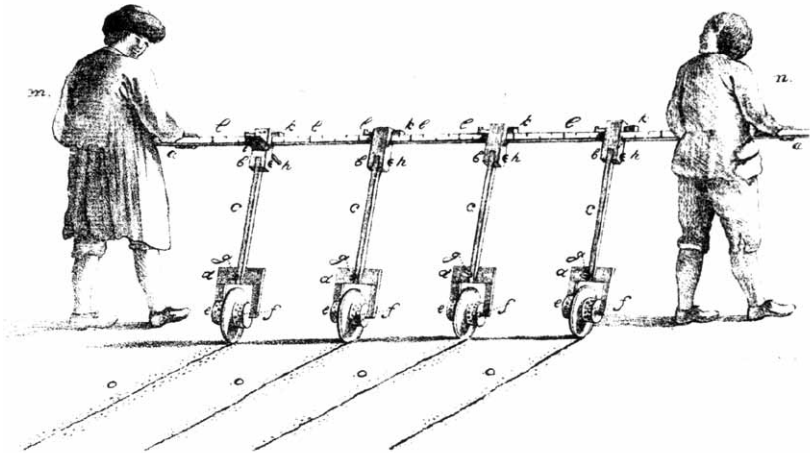


Illustration 2.6. Sowing of coleseed in rows.

In 1815 the clergyman Uilkens from Groningen constructed this piece of equipment. He mounted a number of small sowing machines that were used for sowing chicory in a horizontal bar, so the mutual distance between them could be easily modified. Source: Numan, 'lets voor landbouwers over zaayen op rijen', 1827.

small rivers, that was caused by the continuing peat digging and moorland reclamation in the hinterland. Thereafter, a better water management enabled farmers to turn some of their low quality grassland into arable land, perfectly appropriate for the cultivation of, for instance, oats (*Avena sativa*). Early-19th century publicists wrote that ever since the last decades of the 18th century the area under oats had increased by about half.¹⁸⁷ As such, oats became an important product of the region, being exported to Britain in large quantities. Consequently oats covered about 44% of the total area of grain in the early 19th century. And thanks to the improvements in the water management system the area of arable land suitable for the growing of winter sown grains could increase as well and production risks could be reduced.

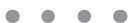
The drive the farmers in Groningen displayed to make investments in order to improve their holdings after the late 18th century is ascribed by some historians to their special status as virtually the owners of their land, although in name they were lease-holders (in Groningen referred to as *beklemde meier*). This special status gave them a great freedom in the use of their lands, while their revenues were not eroded by increasing rents as prices rose. The latter contributed significantly to their willingness to make investments to improve their holdings.¹⁸⁸ And this appears to have been an important condition for the further developments in arable farming in Groningen through the 19th century.

¹⁸⁷ 'Staat van den landbouw', 1821, p. 81.

¹⁸⁸ Formsma, 'Beklemrecht', 1981, pp. 15-16; Priester, 'De economische ontwikkeling', 1991, paragraph 2.2.3.

2.3. Mixed farming in the river clay district and in the loess district of Zuid-Limburg

When the 19th-century agronomist Staring proposed his division of Dutch agriculture into agricultural systems (as a basis for a more adequate agricultural statistical system), he classified farming in the river clay district of the central Netherlands and in the loess district of Zuid-Limburg together in the same group of agricultural districts. The river clay district was largely a part of the province of Gelderland. All this was partly so because geologists then were convinced of the similarity in the pedological characteristics of both regions. Agronomists in later time followed their 19th-century colleagues.



The river clay district in the central-Netherlands is formed by the deltas of the river Rijn and its branches (the river IJssel and the river Waal), as well as of the river Maas, sharply bordered by the Pleistocene sands. As they reached the coastal parts of the country these rivers branched out into the peatland country of the provinces of Utrecht and Holland. There, they covered the existing peatland with a layer of clay varying in thickness. Superficially seen, the landscape of the river clay district, diverse as it is, has only a very little relief. Yet, small as these differences in level are, they go hand in hand with important differences in soil types reaching from the somewhat higher stream levees to the low lying river basins (*kommen*) or back-swamp lands. The levee soils consists of easy-to-work, sandy clay; the latter back-swamp soils are heavy, lime-deficient soils, with a very compact constitution. For this reason, the river basins were very difficult to drain naturally and were flooded for most of the year. The levees, on the other hand, were already settled at a very early stage and thereafter permanently occupied, since these were also the parts of the natural landscape where the arable was situated. In contrast, the river basin areas remained uninhabited and almost a wilderness, until very recently.

The complexes constituting the arable land of the settlements on the levees were in fact quite similar to the *essen* and *engen* of the sandy parts of the eastern provinces and can be seen as a regional variant of the open-fields. They are usually indicated as *enken* or *akkers*. The lower parts of the levees, sloping down to the river basin, were traditionally used as pasture land or occasionally as arable land to grow a spring sown crop. After the 14th century a fully closed system of dikes was established, protecting the land from the flooding river, especially during the winter. From then on, the basin areas could also be exploited agriculturally more intensively. Paradoxically, however, as the dikes were raised and improved new problems arose which in time would affect farming in the river clay area through and through. Because, as dikes were built up higher, the river deposited all its silt material between them, causing its flood bed to rise ever higher in relation to the surrounding landscape. Drainage of the low lying basin now became an increasing problem and when dikes did break, this caused far more damage than before.

Furthermore, as the flood bed was raised ever more seepage water (*kwel*) from underneath the dikes percolated into the cultivated land with every winter high water, especially in places

where dikes were built upon a sandy subsoil. Because of this seepage water, the arable on the lower parts of the levees was often too wet after the winter floods into the spring to be ploughed and worked to sow the new spring crop in time. And if even if this was not the case the arable remained too 'cold' for crops to develop and grow in the early spring. At this time of the year when warmth in particular affected their growth, the development of crops was retarded for this reason. As a result in this early stage of growing the crops were pushed aside by the much faster developing weeds. Heavily weed polluted arable lands, therefore, were the principal evil ruling arable farming in the river clay districts. Around the mid-19th century agricultural publicists described the *engen* in the Neder-Betuwe district as 'true flowering gardens full of poppies, cornflowers, chamomile and charlock'.¹⁸⁹ Charlock in particular appeared to have been so abundant that, 'often, in the spring the shooting up crop was already completely covered with a carpet of yellow flowers'.¹⁹⁰ Weeding therefore was unfeasible and usually limited to removing thistles only. All extra labour employed to fight weeds was useless and would not pay off anyway. So farmers contented themselves with lower yields that were then achieved at lower costs. As a result, arable farming here had a much less labour intensive character than, for instance, arable farming in the marine clay districts, especially in the south-western delta. In general, elements like these forced farmers to follow a broad-based farming system on a large type of farm, here usually indicated as *bouwing*. And yields were low indeed. In the early 18th century wheat yields did not usually exceed 10 hl/ha.¹⁹¹ However, the differences with, for instance, the Zeeland wheat yields were less great than these numbers may suggest. Farmers in the river clay district had much lower labour costs than their colleagues in Zeeland. Yet, in some parts of the river clay area a number of highly specialised types of farming emerged. There, farmers dedicated themselves to the cultivation of special crops like hemp, hops, and – some time later on – potatoes and tobacco.

In the western-most part of the river clay district, in the Alblasserwaard, the Krimpenerwaard and the Lopikerwaard, the cultivation of hemp had developed on so-called *hennepwerven* or *hennepstuynen* (hemp gardens). Hemp was produced here in a true symbiosis with dairy farming, that is to say the production of full cream cheese. And during the second half of the 17th century and the first decades of the 18th century hemp growing was still very much the mainstay on the farms in these districts. However, after 1730 there was a sharp decline in the production of the Dutch canvas weaving mills and rope-yards. This was caused not only by the new, protectionist trade policies of hemp-importing countries like England and Sweden but even more so by the competition of canvas from Russia, countries which had been important customers of Dutch canvas for a long time. The decline in canvas and rope production eventually meant that hemp growing could not escape a sharp contraction. In the course of the 18th century cheese production became increasingly important. The process continued at a pace into the 19th century, making the *waarden* into

¹⁸⁹ Brakell van den Eng, 'Losse gedachten', 1850, p. 13.

¹⁹⁰ Boone, 'De landbouwkunst', 1867, p. 65.

¹⁹¹ Brusse, 'Overleven door ondernemen', 1999, annex 14.

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one of the most important farm cheese production districts in the Netherlands. At the same time, hemp cultivation virtually vanished.

In a region called the Land van Heusden and Altena (the southwestern-most part of the river clay area) hop cultivation had flourished ever since the Late Middle Ages. As such, the region was contiguous to a rather large area around the town of 's-Hertogenbosch (in Noord-Brabant) where hop cultivation was to be found as well. Both regions, together with some other parts of the river clay area (the Bommelerwaard, the Tielerwaard and the Betuwe) were in fact one large hop region. Important centres in the Bommelerwaard were the villages of Nederhemert, Ammerzoden and Hedel. There, hop cultivation survived on some scale well into the 19th century.

Hop growing here, had its heyday during the first half of the 17th century, when most of the hop was sold to the breweries in the towns of Holland. Thereafter, however, a continual decline in beer consumption occurred, as beer was rapidly replaced as the most popular drink by cocoa, coffee and tea. At the same time, beer consumption also suffered from the rapidly increasing popularity of *jenever* (geneva, gin).¹⁹² Consequently, the number of breweries in and outside Holland rapidly decreased. On top of this, hop growers had to compete with an increasing amount of hops coming from Belgium (from the town of Poperinge) and Germany. They were therefore confronted with a shrinking market during the second half of the 17th century. And when the 17th-century publicist and physician Blankaart in his famous *Kruid-boek* (1698) wrote about 'entire fields' being planted with hops in this area he obviously did so from a late-17th century perspective and a time long gone.¹⁹³

It is probably for this reason and not by coincidence that the earliest traces of potato growing – except for those in the south-west of Zeeland – were to be found in the river clay area in 1697.¹⁹⁴ As hop growing became less profitable the potato proved to be a very suitable substitute crop, especially on smaller holdings and they were often cultivated in share cropping by land labourers on plots of land of the larger farmers.¹⁹⁵ As with the cultivation of hops, potato cropping also involved a lot of labour, because of the intensive spade tillage required. In the early 19th century it was reckoned that cultivating one hectare with potatoes demanded almost four times as much labour as one with wheat. In this sense potato cultivation was 'a massive soak for surplus or underemployed labour'. Yet, at the same time, potatoes cultivated by spade yielded considerably more than if they were cultivated by ploughing.

In the French period, in the Bommelerwaard district, about one third of the arable was planted with potatoes and the area was still expanding then. In 1845, just before the phytophthora struck, potatoes covered 26% of the arable in the whole of the river clay district

¹⁹² Bieleman, 'De Noord-Drentse hopteelt', 1981; Unger, 'Brewing in the Netherlands', 1988; Van Zanden, 'De economie van Holland', 1987, pp. 589-593; Yntema, 'The brewing industry in Holland', 1992.

¹⁹³ Blankaart, 'Den Nederlandschen herbarius ofte kruid-boek', 1698, pp. 237ff.

¹⁹⁴ Roessingh, 'Inlandse tabak', 1976, pp. 347-349. Roessingh, 'Het begin', 1976.

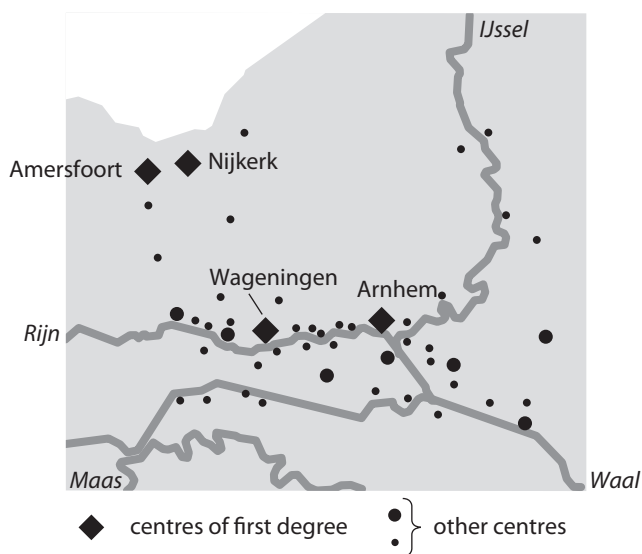
¹⁹⁵ Wttewaal, 'Landbouwkundige beschrijving', 1834, p. 23.

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in the province of Gelderland (Map 2.3). In absolute numbers the area under potatoes was even larger than the area under wheat (Table 2.6).

In the westernmost part of the region, however, figures were larger still. In the Tielerwaard 37% of the arable was planted with potatoes and in the Land van Culemborg 39%. The Bommelerwaard beat the lot with as much as 59%. In some municipalities there, the area of the arable planted with potatoes could run up to more than 80%! Many village communities here were socio-economically entirely dependent on the cultivation of potatoes.

No wonder the one-sided orientation towards potato cropping had catastrophic consequences when the potato blight broke out in 1845. This was especially so because the fact that potato growing was in the hands of a large, socio-economically low-ranked group of land labourers and small farmers. Elsewhere farmers found benefit in shifting to earlier sown varieties, which suffered less from the disease. This option, however, was hardly or not at all open to the potato growers in the river clay area, because of the seepage problem. A national relief campaign organised to help the poor in the Bommeler- and Tielerwaard came too late; many of them died.¹⁹⁶ Seen from a countrywide perspective both regions were amongst the most severely struck by the catastrophe.¹⁹⁷ The reverend Hooyer, initiator of the campaign, wrote: 'Because of the dearth relief paid only one quarter of the food



Map 2.3. Tobacco culture centres in the central parts of the Netherlands, during the first half of the 18th century.

Composed by H.K. Roessingh, based on data in: Roessingh, 'Inlandse tabak', 1976.

¹⁹⁶ Hooijer, 'De groote nood des hongers in en bij den Bommelerwaard', 1847.

¹⁹⁷ Bergman, 'The potato blight', 1967, p. 400.

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Table 2.6. The crop assortment in the river clay district in the province of Gelderland, in 1845.

	hectares	%
Wheat (winter sown)	8,330	24
Rye (winter sown)	4,840	14
Barley (winter sown)	170	1
Barley (spring sown)	1,300	4
Oats	3,980	12
Buckwheat	1,250	4
Potatoes	9,050	26
Pulses	2,460	7
Oil seeds (winter sown)	660	2
Oil seeds (spring sown)	120	0
Flax	140	0
Tobacco	650	2
Hemp	40	0
Hops	40	0
Mangolds	120	0
Clover and vetches	1,130	4
Total	34,280	100

Source: 'Mededeelingen en handelingen van de Geldersche Maatschappij van Landbouw' 1 (1846).

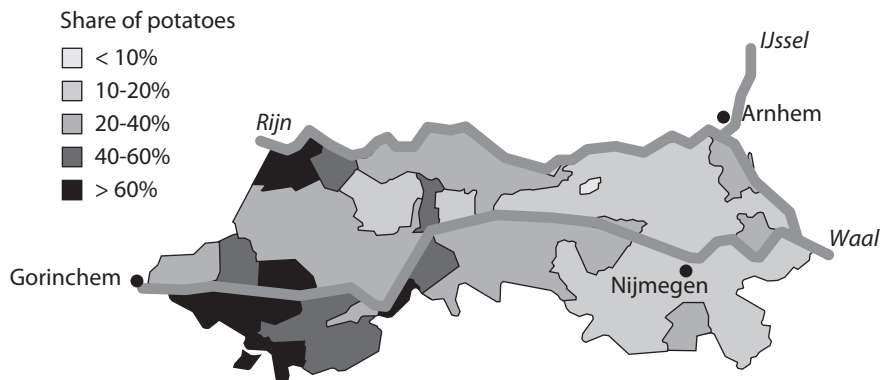
needed. People consumed things green from the land, boiled in water with some barley meal. Dung-hills were searched for eatables. ... [They] chew willow bark to silence their hunger, ...steal and cook cats and sick goats. Large groups of beggars, who could no longer be fed by the citizens...'¹⁹⁸

Another new and labour-intensive crop that spread with unusual speed after the mid-17th century was tobacco.¹⁹⁹ Already during the first half of the 17th century, it had been a popular crop along the westernmost fringes of the sandy Veluwe district. As the situation for arable farming became less profitable, a remarkable expansion of the crop occurred, initially especially in the sandy regions. After 1670, however, the crop also spread in the river clay district, in particular in the eastern parts. And as tobacco cultivation had its heyday during the first two decades of the 18th century more than one fifth of the national production was produced in the (eastern parts of) the river clay district; the rest in parts of the Veluwe and the sandy parts of the province of Utrecht (Map 2.4).

¹⁹⁸ Quotations borrowed from: Zadoks, 'On the political economy of plant disease epidemics', 2008, p. 101.

¹⁹⁹ Roessingh, 'Inlandse tabak', 1976; Brusse, 'Overleven door ondernemen', 1999, pp. 228-233.

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Map 2.4. The share of potatoes in the total sown arable in percentages in the river clay district of the province of Gelderland in 1845 (average 26%).

After: 'Mededeelingen en handelingen', 1846.

The success of the tobacco culture (here, as well as in the Veluwe district and Utrecht) arose to a great extent from the system of share cropping. Sharecroppers rented land from large farmers and in return the latter received half of the harvest (and thanks to this many large farmers could at least partially compensate their falling income). This success led to a rapid increase in their numbers: in 1750 in the bailiwick of Valburg (one of the regional centres of tobacco growing) about one quarter (23%) of all households was indicated as *tabakker* (tobacco grower) – 29% as labourer and 18% as a farmer.²⁰⁰ These *tabakkers* formed a group which in the local social stratification was ranked between the large farmers and the group of land labourers.

However, during the second half of the 18th century conditions for tobacco growing gradually became less favourable, due to the growing competition from British colonial tobacco and the culture was reduced in size. In this process the centre of gravity shifted from the westernmost Veluwe district and the Utrecht sands to the eastern parts of the river clay district. Around 1850, after it had been in decline for more than a century already, the latter still held two thirds of the national total of tobacco, with the rest being found in the Veluwe district.



In general the broad-based farming system of the river clay district offered farmers the flexibility they needed to get them through the depression after 1650. And it seems that the long-lasting economic regression thereafter had less dramatic consequences here than elsewhere. At first, there were the grazed orchards, through which fruit growing (apples, pears and cherries) became an important source of income, like the hay trade especially in

²⁰⁰ Brusse, 'Overleven door ondernemen', 1999, pp. 70-71.

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the westernmost parts of the region. In addition to this, pig breeding and fattening, horse breeding and rearing were also important supplementary revenues for large farmers. For this reason the number of horses on these farms was remarkably high (Table 2.7) Particularly in the most westerly parts of the region, in de Tielerwaard and the Land van Buren, farmers would sometimes have 10 or more mares in foal every year.²⁰¹

Over time, as dikes were improved and built up higher, water management problems paradoxically increased. During the second half of the 18th century in particular, we frequently hear about breaches which caused ever more damage and casualties.²⁰² For the same reason the problems caused by seepage increased as well. Finally after 1750, when the economic situation gradually improved and the profitability of agriculture increased again investments could be made to tackle this problem. From then on, locally, polder boards began to construct seepage embankments on the landside of the dikes, in places where the seepage problem was the most serious. These so-called *kwelkaden* were designed to hold the seepage water that came from underneath the dikes.²⁰³ Yet, it was not until the 1950's that a large-scale approach finally brought an end to the many problems connected with the bad situation in water management in the river clay district.²⁰⁴

Table 2.7. The number of farms according to their number of (adult) horses, in some arrondissementen (administrative districts) in the river clay district in Gelderland, in 1807.

	1 horse		2-3 horses		≥4 horses		Total	
	abs.	in %	abs.	in %	abs.	in %	abs.	in %
Buren	53	11	211	45	209	44	473	100
Tiel	37	8	274	57	166	35	479	100
Betuwe	212	41	138	27	165	32	515	100
Zaltbommel	106	16	341	53	193	30	640	100
Maas en Waal	188	44	208	49	30	7	426	100

Source: National Archives, Den Haag, Collectie Gogel, inv. no. 73.



²⁰¹ Roessingh and Schaars, 'De Gelderse landbouw beschreven omstreeks 1825', 1996, p. 202.

²⁰² Driessen, 'Watersnood tussen Maas en Waal', 1994.

²⁰³ Mentink and Van Os, 'Over-Betuwe', 1985, p. 106.

²⁰⁴ Driessen, 'Landbouw en landschap in het rivierengebied', 1995.

The Zuid-Limburg peneplain and terraced landscape with its loess soils has its own and very special position in the Netherlands. In its geology, its relief and its soil conditions it has in fact a far greater resemblance to the adjacent parts of Belgium and Germany. Around the year 1000 still only about one tenth of the loess region was occupied and cultivated as only the deeply cut river valleys were inhabited. In the following three centuries, however, the loess-covered chalk plateaus were occupied from the mother settlements in the valleys and new settlements were established on top of the plateaus. And around the beginning of the 14th century the open plateau landscape as it is now, was born.²⁰⁵ The cultivated lands of the settlements were laid out such that they in fact formed a variant on the theme of the north-western European open-fields. The physical conditions of the Limburg loess soils were very suitable for cropping. Loess soils are indeed easy to till, by their nature well-drained and they do not have problems with winter water that would hinder the prosperous development of the crops in the early spring. At the same time they are able to store enough water to enable a crop to grow throughout the summer season. The availability of plant nutrients in these types of soil, however, should not be exaggerated. In this respect they take a middle position between the mineralogically poor sandy soils and the river levee soils.

The early history of farming in Zuid-Limburg is still very much a *terra incognita*. Yet it is clear that for centuries farming was dominated by the quite one-sided cropping of cereals. Sixteenth-century documents reveal that a three-course rotation must have been quite common then. After two years with cereals (winter sown corn, followed by spring sown corn) the arable was laid fallow. Cattle numbers were small, due to a structural lack of grassland; especially on top of the loess plateaus. In 1820 in the village of Margraten 123 livestock keepers together had only 381 head of (mature) cattle, or about 3 per farm. Only on the largest holdings could this number go up to 10 to 15 head. Most farmers only had one horse.²⁰⁶ Elsewhere on the loess plateaus the situation was similar. A small number of cattle like – consequently – a constant shortage of manure forced farmers to follow a low labour input type of farming. Moreover, instead of manuring farmers confined themselves to a great extent to simply marling their arable, improving the acidity of the topsoil making nutrients available for the crop.²⁰⁷

As grain cropping prevailed, rye and spelt were prominent. The latter was preferred by the farmer over wheat because it was more winter-hardy – as was rye. Both were typically low-risk crops. Initially wheat was cultivated only sporadically. However, at an early stage farmers had already learned to combine the advantage of wheat (which had the prospect of higher pecuniary revenues than spelt did) with the low-risk qualities of rye by sowing them together as a mixture called maslin.

After the mid-17th century, when grain prices fell, Limburg farmers tried to maintain their income by intensifying their cropping systems. As such, they tried to expand the area under rye as well as the area under – more risky but better paying – wheat. It went at the

²⁰⁵ Hartmann, 'De reconstructie', 1986.

²⁰⁶ Van de Westeringh, 'Enkele aspecten', 1983.

²⁰⁷ Jansen, 'Op weg naar een groene landbouwgeschiedenis', 1994, pp. 141-143.

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expense of the area of spelt. Yet, during the early 18th century on the Termaar estate (near the village of Margraten) spelt still covered almost a quarter of the total sown area. Thereafter, however, spelt rapidly lost its significance.²⁰⁸

In their attempt to expand the area under wheat, however, farmers often came up against the ecological limits of their cropping system as they were confronted with all kind of plant diseases.²⁰⁹ And as experiments with spring sown wheat also failed, farmers were impelled to reduce the area under wheat again and to grow more rye.

As in the river clay district fruit growing in pastured orchards must also have been an important source of income. Ever since the early 18th century villages surrounded by orchards became a common feature in the open loess plateau landscape. Apples and pears were bought by traders (from nearby, smaller towns) going from farm to farm. In the 1740's it was reported that black cherries were transported by ship even as far as Rotterdam, almost 300 km downstream of the river Maas.²¹⁰ However, given the fairly peripheral location of the loess district, it was more sensible for farmers to try and add value to their rather bulky and vulnerable fruit products by processing them into syrup, cider or vinegar. And so many did, especially larger farmers. For the same reason many apples and pears also found their way to customers after they had been dried. Fruit drying was done not only on the farms in their bread ovens, but also in specialised fruit drying shops. The town of Maastricht had a special fruit-mongers guild, whose members were concerned with fruit drying.²¹¹

After 1650, in a situation of economic decline it was socially and economically of great importance that many farms were leased in *halfwinning* (half tenure or in French *métayage*), i.e. tenants had to pay half of the physical revenues of their crops as rent. Though, at first sight, *halfpacht* may seem like a high rent, the important thing was that tenant and owner shared all uncertainties, changeableness and risks that farming entails on an equal basis. And, especially during a period of decline, it was important that price risks were spread evenly between the two.

Halfwinning tenure (or share cropping) often also implied that the owner took care of the maintenance of the farm buildings and implemented all kinds of improvements and the technical set-up of the farm. Sometimes an owner contributed to the costs of threshing and in case of a crop failure he might help out by handing out sowing seed for a new crop or buying hay or oats to feed the stock. It was also significant that the owners often tried to raise the farm practice to a higher level by making investments in new and better farm buildings. This resulted in a trend in which the Zuid-Limburg farmstead evolved in a number of steps to the farm with its typical square-shaped layout that has become known as 'typically' Limburgian. By doing so the capital-supplier, the owner, tried to strengthen his own position by helping his tenant(s) to maintain his farm revenues or increase them, so he

²⁰⁸ Ruwet, 'Mesure de la production agricole', 1964, p. 634.

²⁰⁹ Jansen, 'Landbouw rond Maastricht', 1968, p. 50; Dewez, 'De landbouw in Brabants Westhoek', 1958, pp. 31-33.

²¹⁰ Sangers, 'Gegevens', 1953, p. 147.

²¹¹ Personal communication from Prof.dr. J.C.G.M. Janssen, Maastricht.

had a certain guarantee that his tenant was able to fulfil his liabilities. In fact *halfwinning* turned their relationship into a sort of joint venture between tenants and owners, which gave the former flexibility to survive the economic hardship of this period.

As the economic tide turned, after 1750, this complex of improvements and investments formed the basis for structural changes in the farming system. Clover and other feed crops enabled longer rotations and the old three-course rotation was replaced by a four-course rotation, as winter corn was sown twice in succession. As the cattle stock was kept inside on a stall feeding system, it was possible to produce more manure and consequently fallow could be permanently reduced. During the second half of the 17th century, on the Louwberg estate, a holding with 12.6 ha of arable land (in 15 plots) near Maastricht, 20 to 30% of the arable was still under fallow. From 1760 onwards, however, this was reduced to less than 10%.²¹² Elsewhere similar results were achieved. Since the share of hard-grains could be expanded, the area of rye in particular increased. Producing more straw than wheat or spelt would, which, in turn, also benefited the manure production. On another holding, the Gasthuis estate, in the village of Bemelen, the farmer managed to expand the part of the arable that he was able to manure each year in a relatively short period of time, from 18% (in the years 1745-49) to 27% (in the years 1764-73).²¹³ Just after the middle of the 19th century rye, immediately followed by wheat, were the most important crops by far in Zuid-Limburg (Table 2.8).

However, due to the one-sided orientation of arable farmers of the loess district towards cereal cropping, productivity was much lower than in the south-western and northern marine clay districts. In the 1850's, wheat, for instance, only produced 15 to 16 hl/ha.²¹⁴ Yet back then, farmers knew how to benefit from a changing situation as exports increased to the adjacent and rapidly industrialising regions south of the Aachen-Liege border.²¹⁵

²¹² Jansen, 'Landbouw rond Maastricht', 1968, p. 52.

²¹³ Bauduin en Jansen, 'Aspecten', 1969, p. 73.

²¹⁴ Philips, 'De landbouw in een statische maatschappij', 1992, p. 177.

²¹⁵ Jansen, 'Tithes and the productivity', 1978, pp. 77-95.

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Table 2.8. The crop assortment in the Zuid-Limburg loess district, in 1875.

	hectares	%
Wheat	12,731	27
Rye	13,508	29
Barley	908	2
Oats	6,360	14
Buckwheat	993	2
Potatoes	4,894	10
Sugarbeets	196	0
Beans and pulses	2,079	5
Oil seeds	164	0
Flax	99	0
Others	43	0
Mangolds	1,286	3
Clover	3,693	8
Total	46,954	100

Source: 'Verslag van de landbouw' over 1875, pp. 43-46.

2.4. Livestock farming

Although livestock farming had reached extraordinarily high levels in terms of development during the 16th and early 17th century, it was still liable to much insecurity and economic uncertainty. As such, highly specialised dairy farming, in particular, offered farmers very little opportunity to adapt to the declining economic situation in the course of the second half of the 17th century. The scissor-like movement of falling prices and increasing costs hit dairy farmers like those in Noord-Holland in particular. Initially, after 1650, dairy prices had kept up fairly well, although competition from foreign dairy producers – especially the Irish – grew stronger. In the long term, however, dairy prices fell just as much as the price of grains. And while arable farmers generally had ways of adjusting their farm management one way or another, livestock farmers had much fewer opportunities to do so or none at all. Furthermore, soil conditions in the peaty parts of the coastal provinces usually offered them hardly any other choice.

In addition to all that, in the very nadir of the secular contraction livestock farmers were ruthlessly hit by a series of an extremely high mortality amongst their cattle, caused by the infamous cattle plague. Although reports on livestock mortality come to us from all periods of time, it was the way in which the cattle plague struck Europe during the 18th century that had a particularly overwhelming impact on contemporaries and their descendants. The cattle plague afflicted Dutch cattle herd in three waves. The first came during the years 1713-20, the second in 1744-65 and the third in the period 1768-86.²¹⁶ When the pestilence turned up again in Europe in 1798, it did not reach Dutch herds.

Although we still do not have a national overview it is obvious that the first two outbreaks claimed the most casualties by far. In most livestock farming areas three quarters or more of the herds were annihilated. And it was not unusual for farmers to lose their complete stock several times in succession. From some regions some data has become available that gives us some insight into the extent of mortality on a regional level. In Friesland, for instance, in the 15 months between December 1713 and February 1715, 66,000 head of cattle died. During the second wave mortality rose catastrophically. Between November 1744 and August 1745 – so in the 10 months after the infection had reached Friesland – 135,000 head of cattle perished. And between November 1747 and April 1748 another 23,000 died. As a comparison, during the second half of the 18th century the total number of cattle in Friesland amounted to as much as 160,000. In one of the Friesian districts, Hemelumer Oldeferd, 2,824 of the total number of 2,844 cattle were infected, of which 2,554 (90%) died; only 20 animals were spared from the disease. During the third period, between May 1769 and December 1769 again 98,000 head of cattle succumbed in Friesland.²¹⁷ In the northern part of the province of Noord-Holland, the Noorderkwartier, almost 62,300 (80%) of a total number of about 77,600 animals were infected between autumn 1744 and

²¹⁶ Faber, 'Cattle plague', 1962; also: Buisman, 'Tussen vroomheid en Verlichting', 1993, vol. I, pp. 109-155; Spinage, 'Cattle plague', 2003.

²¹⁷ Faber, 'Cattle plague', 1962, p. 2.

spring 1745; more than 54,300 (70%) of them died. In the Schermer polder, in the 8-year period between 1744 and 1752 about 11,600 head of cattle died, which was more than two and a half times the normal total size of the herds there.²¹⁸ Between 1769 and 1784 more than 400,000 animals succumbed in Holland.²¹⁹

In many ways, the decade between 1744 and 1754 stands out as the worst period. All the more so as the plague arrived at the worst moment of the secular depression which had set in after 1650, and which had left farmers hardly any financial elbow-room to invest in new herds. Even so, it is amazing to see how they were able to restore their herds to their former level in a relatively short period of time.

During the 19th century, in 1865, a new outbreak of the cattle plague frightened Dutch farmers after a number of infected bullocks imported from England had been landed in Rotterdam. Between July 1865 and December 1867 about 57% of the total number of cattle (about a quarter of a million) in the provinces of Utrecht and Holland were infected; 30% of them died and another 9% were finished off.²²⁰



When the economic situation slowly worsened after 1680, the labour intensive method of farming to which farmers were accustomed decreased profitability rapidly (Figure 2.1). High labour costs meant that farmers tried to cut back these expenses, which in fact resulted in a trend of extensification. In some regions the consequence was that farmers took less care of the quality of the land, pasture land in particular.²²¹ In Friesland the trenching of these lands – usually done by casual workers during the winter months – was done with at longer intervals. Consequently the number of complaints about the spreading of the toxic marsh horsetail (*Equisetum palustre*) was heard with an increasing frequency.²²²

In order to try to cut down labour costs, Friesian dairy farmers shifted partly to the production of hay, reducing their number of dairy cows and consequently the production of butter. And instead of having the hay making done by their own regular labourers, they increasingly employed much cheaper, seasonal workers, coming from Westphalia, the so-called *Hannekemaiers*. They came in their thousands each year in the summertime on foot to the Dutch coastal provinces to work on the land and their numbers increased dramatically after 1680.²²³

As an example of how farm management could be run more economically in the worsening conditions the 18th century Friesian publicists Ypey demonstrated how a farm with 18 dairy cows instead of the usual 22 was better off financially as the income was

²¹⁸ Van der Woude, 'Het Noorderkwartier', 1972, pp. 585-593.

²¹⁹ In 1769 there were a total of about 225,000 head of cattle. These numbers are excluding calves. Faber, 'Cattle plague', 1962, p. 2.

²²⁰ 'Verslag over den Landbouw' 1866, pp. 310-398; Hengeveld, 'Het rundvee', vol II, 1865.

²²¹ Faber, 'Drie eeuwen Friesland', 1972, p. 221.

²²² Van der Woude, 'Het Noorderkwartier', 1972, pp. 594-595.

²²³ Lucassen, 'Naar de kusten van de Noordzee', 1984, pp. 65-71, and 171ff., especially graph 1.



Illustration 2.7. Hannekemaaiers from Westphalia and Ostfriesland at work in Friesland. During the second half of the 17th century ever more seasonal workers or hannekemaaiers from Westphalia and Ostfriesland came to help farmers in the grassy livestock farming regions – especially in Friesland – to harvest their hay. Source: Friesland Bank, Leeuwarden.

supplemented with higher than normal sales of hay.²²⁴ The hay was exported to towns in Holland where it was very much sought after as fodder for horses (Table 2.9).

In practice the declining butter production in Friesland is the result of a rather drastic fall in the supply of butter to the market in the town of Sneek, reaching its very nadir about 1710.²²⁵ In dairy farming the inevitable cutting of labour costs led to the rapid diffusion of the horse-driven churn mill. The oldest recording of this device dates from 1660, but it spread especially quickly after 1675.²²⁶ At first, the churn mill was probably meant to cope with the increasing production – which could obviously no longer be managed by hand. Soon, however, it turned out to be the most effective means of employing labour, and as such must be valued as a labour-saving investment.

²²⁴ Faber, 'Heu oder Butter', 1974.

²²⁵ Faber, 'Drie eeuwen Friesland', 1972, p. 598 (graph IV.15). De Vries, 'The Dutch rural economy', 1974, p. 163 (graph 4.1).

²²⁶ Van der Poel, 'Honderd jaar landbouwmecanisatie', 1967, p. 62.

Part 2 – The period 1650-1850

Table 2.9. Comparison on the basis of two models of farm management on a farm in the Friesland livestock district in the periods 1720-30 and 1765-80¹.

	1720-30		1765-80	
	Farm management I: 22 dairy cows without hay selling	Farm management II 18 dairy cows with hay selling	Farm management I 22 dairy cows without hay selling	Farm management II 18 dairy cows with hay selling
Revenues from butter sales	594.-	486.-	1,039.50	850.50
Revenues from skimmed milk cheese sales	99.-	81.-	264.-	216.-
Revenues from cattle sales	150.-	120.-	300.-	240.-
Extra revenues from hay sales		201.65		156.65
Revenues from the letting of early pasturing, minus manure purchase		18.-		30.-
Savings from having fewer imposts and taxation's		18.-		24.50
Total	843.-	924.65	1,603.50	1,517.65

Source: Faber, 'Heu oder Butter', 1974 (based on data published by the 18th century publicist Ypey).

¹ This model is based on a farm with 28.8 ha of land, 22 (or 18) dairy cows, 6 (or 5) heifers, 6 (or 5) calves, 3 sheep, 8 lambs, 2 pigs, 8 piglets and 2 horses. Each year 5 (or 4) cows are sold. Following farm management model 2 the hay from an extra 4.3 ha of land can be sold. Revenues expressed in Dutch guilders.

Another aspect of the farmer's attempts to cut costs in this period was an obvious trend towards bigger farm units, which was apparent after 1650, not only in Friesland, but also in Holland (as it was in the arable farming districts). In Holland there were, in addition to this trend to enlarge farms, other signs indicating a cut-back in production to save labour costs. This is very tersely demonstrated by a declining market supply of cheese to the two most important cheese markets in this former county: Gouda and Alkmaar. In Alkmaar shortly after 1650 supplies had already fallen; in Gouda supplies dropped after 1680 from about 6.3 million pounds to 2.5 million.²²⁷ A shift in the regional farming system led to

²²⁷ Van Zanden, 'De economie van Holland', 1987, pp. 597-602; De Vries, 'The Dutch rural economy', 1974, p. 160 Table 4.12.

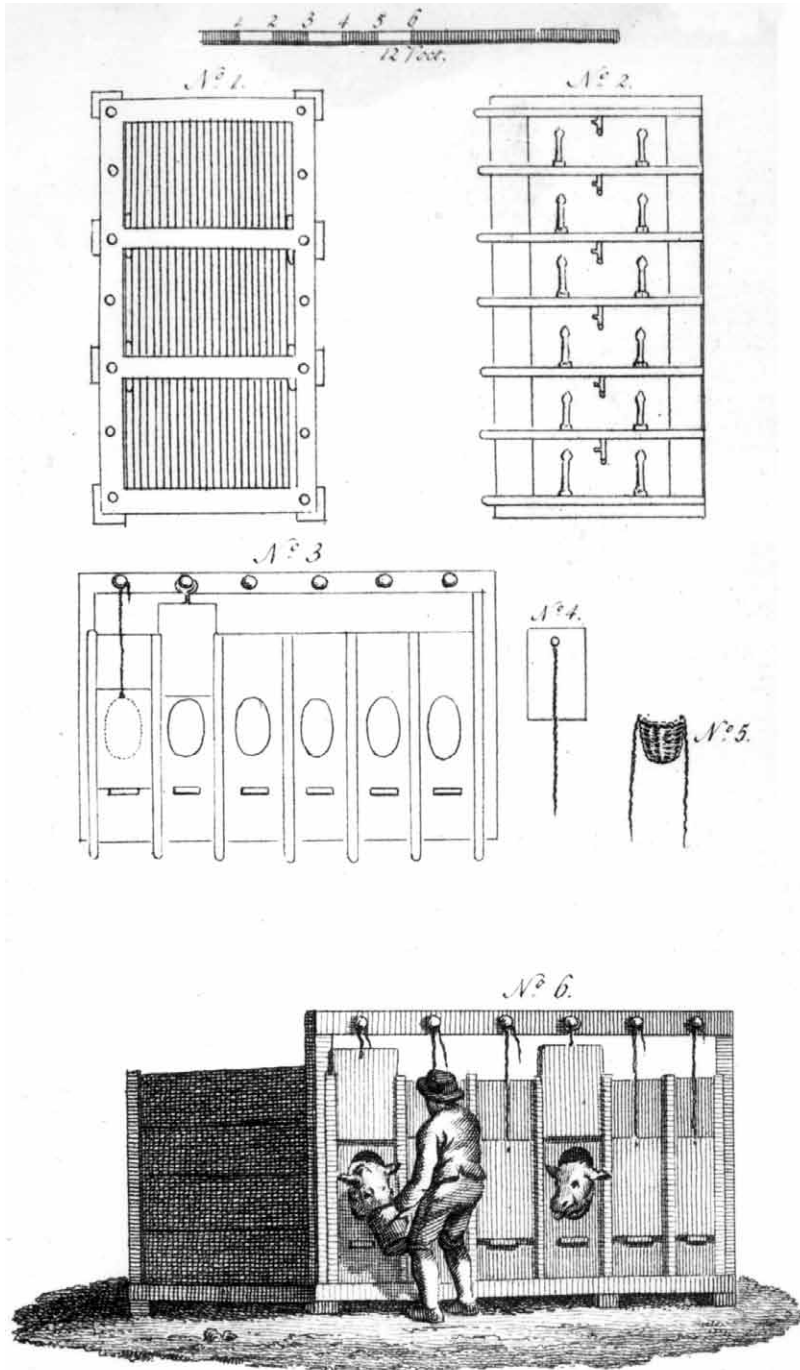


Illustration 2.8. The fattening of boxed calves in the 18th century.

Source: Hazeu, 'De onderwijzende landman', 1820.

a further decrease until, eventually in 1804 the total yearly supply amounted to no more than 1.9 million pound.

As far as the Alkmaar region is concerned, the falling market supply possibly had to do with a shift from labour-intensive dairy production (full-cream cheese) to the fattening of calves to produce veal. Usually, on the highly specialised dairy farms of Noord-Holland, most of the calves were taken away and not reared, as all produced milk had to be reserved for cheese production. But as the economic tide turned, these calves were retained for fattening, as this process required considerably less labour than cheese production. ‘The fattening of calves has the advantage of requiring much less labour than dairying,’ a 19th-century agricultural publicist wrote.²²⁸ Maintaining the maximum size of the dairy herd to transform all milk into dairy products proved to be less favourable than keeping a smaller dairy herd and using the produced milk at least partially to fatten calves.

What was striking in this era of agro-economic stagnation and decline were the developments in the livestock area around the Zuid-Holland towns along the river Maas: Schiedam and Delfshaven. In this region – later called the *Spoelingsdistrict* (*spoeling* = distiller’s wash or draff) – livestock farmers used large quantities of draff produced by the emerging distillery industry, after the late 17th century. The number of distilleries had increased from about 10 around the middle of the 17th century to 120 in the town of Schiedam alone. The rapid expansion was enabled by the fact that distillers benefited from the export subsidies the British government granted their farmers, as the exported grain, i.e. barley and barley malt.²²⁹ Firstly, farmers used the draff mainly for fattening pigs; later they shifted primarily to cattle which were milked while they were fattened.²³⁰ Also around the town of Weesp (near Amsterdam) and in de Zaanstreek (north of Amsterdam) a similar farming system emerged, although on a much smaller scale.²³¹

The fattening of oxen, which had emerged as a major activity in the Noorderkwartier district especially during the latest part of the 16th and the early 17th century, was later to lose its significance, especially after 1724. In that year the States General established an import duty on lean cows and oxen (the vast majority were driven all the way from North-western Germany and particularly Denmark) to protect the already declining interior market. Over a ten-year period the number of imported oxen declined from more than 10,400 in 1724 to 1,840 in 1735.²³²



From the middle of the 18th century onwards the prices of agricultural products did increase again. Although grain prices rose faster than the prices of livestock products – especially during the Batavian/French period – the latter also improved significantly. When, however, after the

²²⁸ Sloet tot Oldhuis, ‘De kalvermesterij op de Veluwe’, 1855, p. 358.

²²⁹ Ormrod, ‘English grain exports’, 1985.

²³⁰ Harbers, ‘Het oude Spoelingsdistrict’, unpublished student thesis.

²³¹ Van der Woude, ‘Het Noorderkwartier’, 1972, p. 551.

²³² Gijsbers, ‘Kapitale ossen’, 1999.

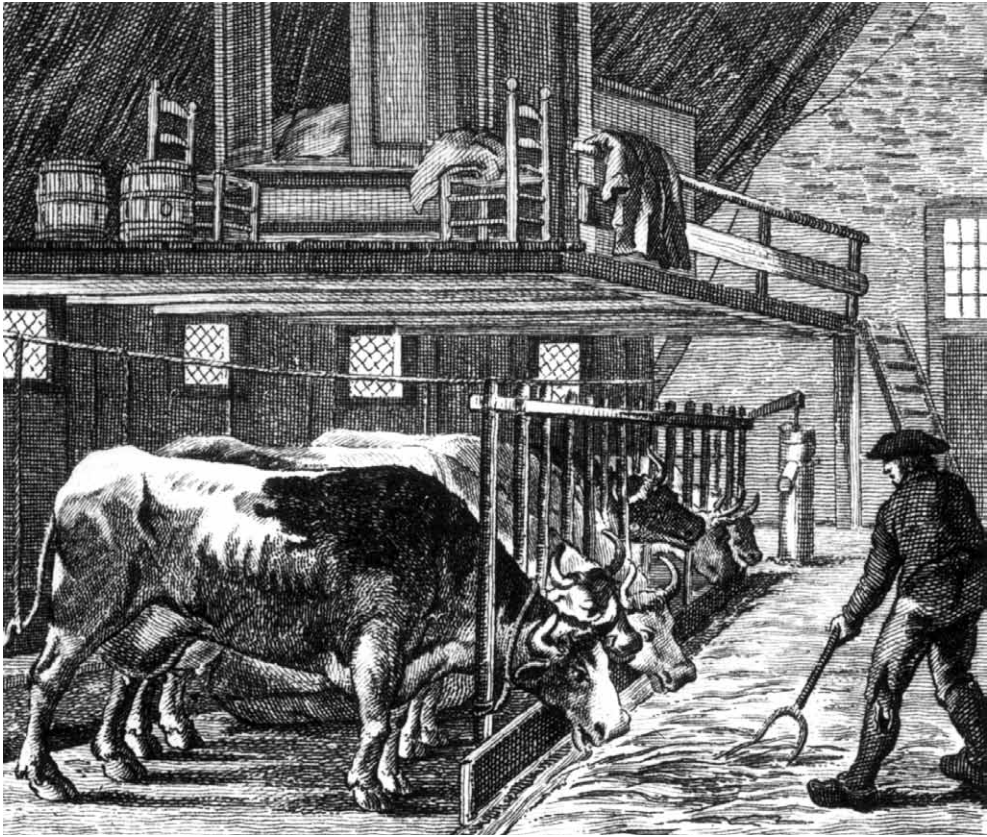


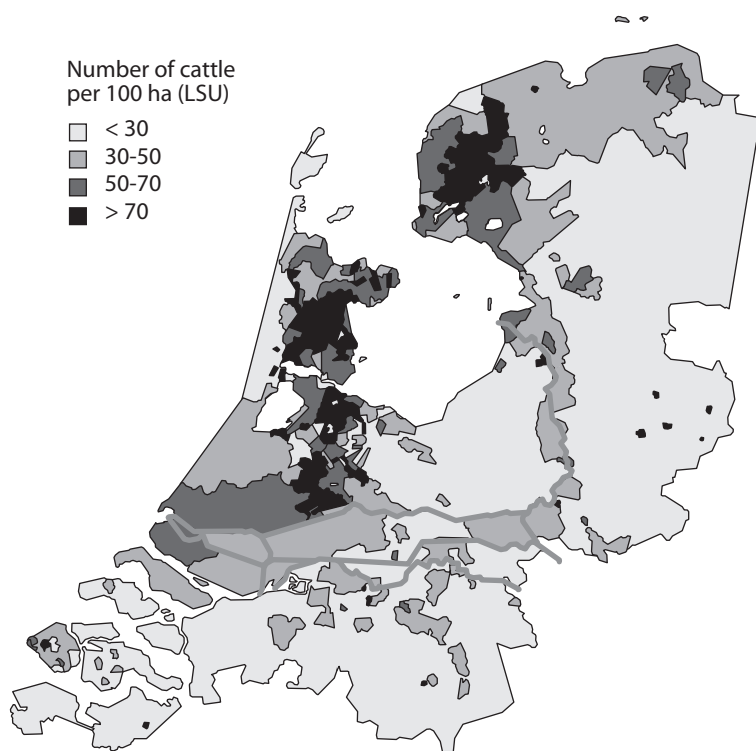
Illustration 2.9. A tie-up cow house (grupstal) in the province of Zuid-Holland, around 1800.

This type of stable, probably introduced from the Late Middle Ages onwards was very efficient and it was considered to be so until after World War II. The animals tails are tied up to improve hygiene in milking. Behind the animals is the dung channel (grup), with a brick floor. In front of them is a large feeding alley complete with a water trough, and with a water pump on one side and a drain on the other. The til, the loft above the animals, could be reached by a ladder and served as a sleeping place for the labourers. Source: Hazeu, 'De onderwijzende landman', 1820.

French period cereal prices fell drastically, the prices of dairy products kept up reasonably well or did not fall at all. Moreover, as wage levels lagged behind prices, it encouraged all kinds of investments, while dairy farming as a whole apparently regained its (former) labour intensive character. In the Friesian livestock district it became a rule (again) for a lease contract to have mandatory regulations concerning the regular trenching of pasture land, the dredging and cleaning of ditches, and the manuring of the land with this dredged mud and stable manure. Exportations of hay fell and stopped completely by about 1800 and the number of cattle grew again. In fact, everywhere cattle herds were being expanded (again) and in the livestock farming districts farmers generally purchased a horse-driven churn mill; while on

smaller farms the dog-driven churn mill became ever more popular.²³³ At the beginning of the 19th century the Friesian dairy district, the Noord-Holland *Middengewest*-district and the livestock district in the borderland between Utrecht and Zuid-Holland were the regions with the highest density of cattle in the country (Map 2.5).

In Noord-Holland the price-induced production increase appears to have led to changes in the technique of cheese-making. In 1808 it was reported by the *Commissie van Landbouw* (Agricultural Commission) that farmers increasingly began to make their cheese less fatty, so it would need less time to ripen. In doing so, they were able to meet the growing demand more rapidly. In the course of the 19th century ever more cheese farmers switched from



Map 2.5. Cattle densities in the Netherlands in 1811.

The number of cattle (in LSU's) per 100 hectares (incl. the common wastelands). The values are based on figures per municipality, except for western Brabant (per canton), and parts of Zuid-Holland and Groningen (per district). Not included: Limburg. Source: Databank Rural History Group WUR.

²³³ Van der Poel, 'Honderd jaar landbouwmechanisatie', 1967, pp. 60-63.

making cheese twice a day to only once, by adding the skimmed evening milk to the fresh milk of the next morning, to be processed into cheese then.²³⁴

In comparison to other parts of Europe dairying in Holland, Utrecht and Friesland was known for its high standards, not only as far as caring for the animals was concerned, but also in terms of the hygiene and care that was given to the actual cheese- and butter-making. In addition to glazed pottery, copper setting pans were replacing the old wooden ones in the course of the 18th century.

In the early 19th century, as a result of a complex of often small improvements milk yields were significantly higher than before. Although there are no statistics on the subject, a careful consideration of all kinds of different sources has revealed that milk yields of normal, good quality dairy cattle on farms in the Dutch livestock districts were as high as about 2,700 to 3,000 litres annually. Of course, many cows produced less, but there were others that produced more and the best were able to produce milk yields as high as 4,000 to 4,500 litres.²³⁵

As the structure of the economy improved during the second half of the 18th century, market supplies in the Friesian market towns increased again. In the Friesian town of Sneek market supply doubled between 1750 and 1850 (Figure 2.5). It is likely that in this period Friesland developed as the 'butter-province' *par excellence* and by doing overtook former butter-producing regions in Holland like Rijnland and Delfland. On top of that, after about 1780 the Friesians no longer exported their butter via the Amsterdam port. From that point on all Friesian butter was exported directly to London from the port of Harlingen. Thus, this town became butter port number one in the Netherlands. In spite of the trade blockade, as part of Napoleon's economic policy this process accelerated during the French period and in 1815 almost three quarters of Dutch butter exports went through Harlingen. As a consequence, the price that Friesian dairy farmers got for their butter was increasingly being determined in London. Despite that, they already held about a quarter of the London market for butter in the early 19th century.²³⁶ And in the following decades the annual exports increased from 3.7 million kg in 1802-09 to 11.8 million in 1845-54 and eventually to 17.9 million kg in the boom years 1866-75.²³⁷

In the eastern parts of the province of Friesland, on the sandy soils of the Wouden district, livestock farming, that is to say dairying, became prominent, at the cost of arable farming caused by the relative price movement after the mid-18th century. The number of cattle increased dramatically, as arable was reduced (Table 2.10).²³⁸

²³⁴ Van der Poel, 'Het Noordhollandse weidebedrijf', 1986, pp. 155-157.

²³⁵ Van der Poel, 'Landbouw in de Noordelijke Nederlanden', 1981, pp. 180-182; Van der Poel, 'Het Noordhollandse weidebedrijf', 1986, pp. 154-155. Concerning Friesland, Faber even mentions a milk yield of 4,800 litres annually based on mid-18th data supplied by Ypey. Faber, 'Heu oder Butter', 1974, p. 193 reference no. 1.

²³⁶ Bos, 'Brits-Nederlandse handel', 1970, p. 232.

²³⁷ Van Zanden, 'De economische ontwikkeling', 1985, p. 372; Pilat, 'Dutch agricultural export performance', 1989, pp. 104-105.

²³⁸ Faber, 'Drie eeuwen Friesland', 1972, pp. 202-203.

Part 2 – The period 1650-1850

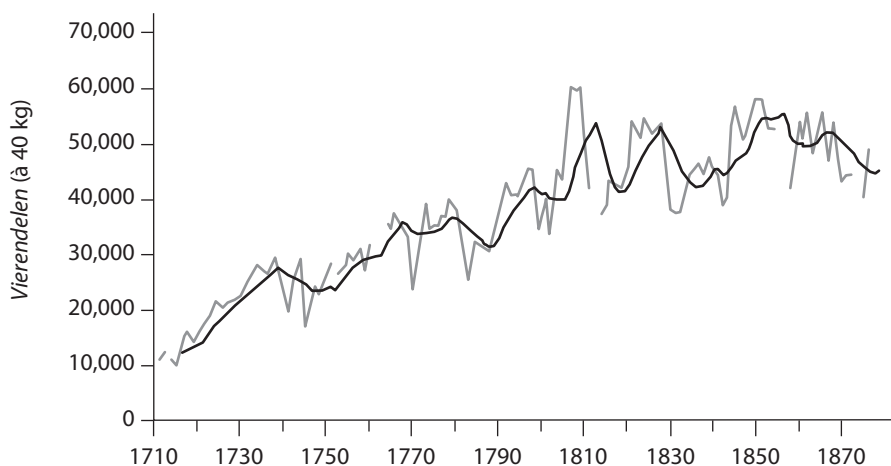


Figure 2.5. The supply of butter to the market of Sneek (Friesland), 1711-1876 in vierendelen. One vierendeel is 40 kg; annual figures and the 5-year moving 10-year average. Source: see Faber, 'Drie eeuwen Friesland', 1972, p. 598 graph 4.15 (1711-1854); the other figures are derived from the *Verslag van de landbouw*.

Table 2.10. The number of cattle and the area of arable land in pondemaat¹ in the villages of Ureterp, Gorredijk, Kortezaag and Langezaag, in the Friesian Wouden district, in 1748-96.

	Number of cattle		Area of arable land	
	abs.	index (1755 = 100)	abs.	index (1755 = 100)
1748	540	51	1,454	118
1755	1,053	100	1,212	100
1780	1,261	120	1,051	85
1796	1,401	133	940	76

Source: Faber, 'Drie eeuwen Friesland', 1972, Table IV.27.

¹ One pondemaat \approx 0.37 hectares.

In the adjacent north-western part of the province of Overijssel dairying also became increasingly important. In regional markets, like the one in Meppel, which served a large part of the region, butter supplies increased significantly during the late 18th century and the

Batavian/French period.²³⁹ In 1849 the agricultural publicist Jennes wrote in his report on livestock farming in Overijssel: 'the high price of butter, as of cattle did stimulate breeding and encouraged livestock farmers to improve their lands such that they could keep more cattle.'²⁴⁰

In the western, Holocene part of the country, Zuid-Holland remained an important butter-producing region – at least for the time being – while Noord-Holland was still the first and foremost cheese district and remained so. During the three last decades of the 18th century cheese supplies from the joint weighhouses in this part of the old county increased from 16-18 million pound to 19-20 million pounds (one pound \approx 469 grams). In addition to markets like Alkmaar, Hoorn and Purmerend, Medemblik, Enkhuizen, Edam and Monnickendam now also increased production. Yet, those in Alkmaar and Hoorn remained the most important ones by far. The share of the weighhouse in the first mentioned '*kaasstad*' quite regularly amounted to 38-40% of all cheese that was supplied to the markets on the Noord-Holland mainland, during the last decades of the 18th century (Table 2.11).

In the Utrecht-Holland borderland, in the Alblasserwaard, the Krimpenerwaard and the Lopikerwaard the former hemp growers made a long-term shift to the production of full-cream cheese. After the 17th century, developments in both the supply and demand sides had already led to a gradual decline in hemp cultivation. Dutch maritime activity had passed

Table 2.11. The average annual supply of cheese on the markets on the Noord-Holland mainland, in the period 1790-99, in pounds.

	Market supplies	
	in pounds	in %
Alkmaar	6,460,782	38
Hoorn	4,513,984	27
Purmerend	2,822,587	17
Medemblik	1,117,512	7
Edam	1,105,800	6
Enkhuizen	608,933	4
Monnickendam	183,512	1
Total	16,813,110	100

Source: Boekel, 'De zuivelexport van Nederland', 1929, annex A.

¹ One pound \approx 469 grams.

²³⁹ Bieleman, 'Boeren op het Drentse zand', 1987, pp. 382-386.

²⁴⁰ Jennes, 'Verhandeling', 1849, p. 26.

Part 2 – The period 1650-1850





Illustration 2.10. Three paintings by the Friesian artist Ids Wiersma around 1920 showing different aspects of traditional dairying in Friesland.

The first painting shows the dairy room in the traditional farm building where the copper setting pans (melkaden or melkmouwen) are set up, supported by longbones. The farmer's wife takes the cream off the milk, while her man takes out a setting pan with skimmed milk outside to the cheese kettle, where this is processed into cheese. The second painting shows the farmer's wife preparing the churn. The churn is driven by a horse mill that is set up at the stable. There, on the third painting, the farmer is busy preparing cheese. His job was to mix the curd with salt and spices (cloves and caraway) and then shaping the cheese to its typical flat cylindrical form. In the centre background, the costly copper cheese kettle can be seen; this is also visible in the second painting. Source: Friesland Bank, Leeuwarden.

its zenith, and other fibrous products such as flax, cotton, jute and even silk competed with hemp. Moreover, cheaper hemp was imported from Eastern Europe. And it was against this background that it proved to be increasingly difficult for Dutch hemp farmers to produce at a profit. They therefore gradually changed over from a combination of hemp growing and cattle rearing to cheese production. By doing so, they also contributed to the fact that the total Dutch exports of cheese doubled from 11.8 million to 22.1 million kg during the first half of the 19th century and then to 27.8 million kg in 1866-75.²⁴¹

The formidable growth in livestock farming since the second half of the 18th and the early 19th century, was also to be seen in the other agricultural districts and other sectors of Dutch farming. From the 16th century onwards Dutch agricultural exports had been dominated by dairy products, but they would become much broader and more varied after the middle of the 19th century.

²⁴¹ Van Zanden, 'De economische ontwikkeling', 1985, p. 372; Pilat, 'Dutch agricultural export performance', 1989, pp. 104-105.

2.5. Mixed farming in the sandy soil districts

During what French historians have called the 'long 16th century' (the period 1500-1650) the rural economy of the various sandy districts in the southern, central and northern sandy regions had become increasingly interwoven, with the urbanised economies of densely populated Flanders first and later in Holland. As a consequence, farming in the sandy parts of Brabant had developed a much more labour intensive character than it had in the more remote north-eastern sands. However, even there, further away from the economic and demographical centre of gravity of the Netherlands then, the rural economy did not yet have the character of what 19th century German economist used to call a *Naturalwirtschaft*. Of course, the extent of self-sufficiency was great, but it was not an aim in itself; it was rather a case of dire necessity. It provided farmers with the necessary endurance in times of economic harshness. The question as to whether farmers here were producing for 'the market' or not, does not do justice to the actual economic situation there and then, which did not have the glaring contrasts that former generations of historians are inclined to see.

Farmers in the sandy districts, however, could not escape from the scissor-like movement of falling prices and rising costs and the profitability of farming here went downhill soon after 1650 as well. Landowners, who let their tenants pay a fixed amount of grain (*vaste zaadpacht*) as rent each year, could not avoid lowering it, if they wanted to keep them on their property. Yet, as economic conditions worsened these tenants still had the advantage of a lower price risk than those who paid their rent in money. The latter had to sell (a part of) their harvest on the market first, and it was always uncertain which price they could agree there. Cash tenancy was indeed not uncommon in some parts of the sandy districts, in particular in the low lying, grassier parts. As an example, in parishes like Apeldoorn, Ede and Lunteren (in the Veluwe district) the rent of 40 to 60% of the arable land was paid in cash around 1650.²⁴² And tenants of the *Bossche Geefhuis* (an institution for poor relief in the town of 's-Hertogenbosch) in the Meijerij in Brabant were already paying their rents in a combination of cash and kind at a very early stage.²⁴³

Yet, during the secular depression, for many tenant farmers in the eastern and northern sandy districts it was of great economic importance that they paid their rent in kind, as a sheaf rent, i.e. in share tenancy (or share cropping). According to this tenancy system, called *garfpacht* (a *garf* is a sheaf), the landowner received a fixed part of the harvest. For the poorest arable lands the tenant usually paid the fourth or fifth sheaf as rent to the owner. For arable lands of an average quality he paid the *derde garve*, the third sheaf; for the best lands he paid the so-called heavy sheaf or *twe op vive* (two to five), which was in fact two fifths or 40% of the harvest. This tenancy system had the important bonus of a reduced risk in terms of price and production for the tenant farmer, as the owner shared the fickleness of the farming business with him. The latter was crucial, given the marginal conditions in

²⁴² Roessingh, 'Garfpacht', 1968/69.

²⁴³ Kappelhof, 'De hoeven', 1984, pp. 166ff.

which farmers in the sandy regions had to work – depending mainly on two crops: rye and buckwheat.

As such, the *garfpacht* system offered farming a certain kind of flexibility which was very important under these conditions. Still it was no wonder that, as the economic situation worsened, certain additional earnings became ever more important. And in some ways they grew out into a structural source of income. Farmers in the most eastern parts of Gelderland (the *Achterhoek*), for instance, began to fatten pigs to sell the best parts after the slaughter each year. They sold the smoked hams and the fat backs to travelling merchants who in turn ‘exported’ these to Holland. Another way of increasing income was to add value to their rye by processing it into gin, a drink that rapidly gained popularity in the course of the 18th century.

Due to all kinds of adaptations and arrangements like these, the secular depression in the sandy districts was probably somewhat milder in character and was less disastrous than, for instance, in Holland. Yet, rural life in the sandy parts of the country was already harsh and sober; the margins between scarcity and abundance were small and there were very few opportunities to scrimp or save.

In general, for most farmers, the only way open to try and cope with the declining economy was to work harder and more efficiently. It was under these circumstances that an innovation like the winnowing mill to clean the seed after it had been threshed – a time-consuming job – was able to spread rapidly after 1700, especially on the larger farms. More generally, however, and unlike what usually happened in the coastal areas, farmers tried to balance their income with their expenditures by increasing production. This was done by intensifying their farming system via the use of more labour. This was, of course, all the more obvious in a situation – here, in the sandy areas – where labour costs were low, and family farming was the dominant form of farming. As a result of a large degree of what economic-historians call ‘self exploitation’, these farming families were able to enlarge the total production of their farm.



After 1750 prices increased again and the situation gradually improved. In many places where the gusto for reclaiming new land had cooled down since the middle of the 17th century, it revived again. In the Veluwe district, for instance, lands which were suitable, were reclaimed into grassland in particular, especially at the beginning of the 19th century.²⁴⁴ Also in Brabant, large parts of the commons were converted into grassland, mainly after the 1780's.²⁴⁵ As the economic situation improved many farmers in Overijssel saw a chance to become the owners of the farm they had worked on for generations as a tenant.²⁴⁶

Increasing profitability, together with an increasing interest among the intellectual elite in farming and agriculture in general, infused by the range of ideas that was brought about

²⁴⁴ Roessingh, ‘Het Veluws inwoneraantal’, 1968/69, pp. 119-120.

²⁴⁵ Kappelhof, ‘De hoeven’, 1984, pp. 166ff.

²⁴⁶ Van Zanden, ‘De opkomst’, 1984.

by the Enlightenment caused some to advocate the idea of apportioning and privatising the vast areas of common lands. Especially in the northern and central parts of the Netherlands, these commons consisted of nigh on endless complexes of *woeste gronden*, wild wastes of poor, pasture land, heather lands, moors, and woodlands. In the five sandy provinces together there may have been about 750,000 ha of them, on average roughly about half of their total area, most of them used commonly.²⁴⁷ But as long as these commons functioned as an integral part of the current farming system these ideas met with very little reaction from the established large farmers. And at the other end of the social spectrum there was a lot of opposition to the idea of dividing the common lands as well. Because for a cottager, a land labourer or an artisan the availability of common land meant having the opportunity to pasture his only cow and to cut some peat or wood for fuel. This right would disappear after division.

Legislation to facilitate the division of the commons that came about under the French regime in 1809 and 1810 therefore hardly had any impact. Local initiatives using these regulations to enclose land into private property, usually soon ran out of steam.²⁴⁸ In 1837, however – and seen in hindsight at the right moment – by a Royal decree it was decided that the laws established in 1809 and 1810 were still in effect, in their entirety.²⁴⁹ From that time on, increasing land prices, symptoms of the fact that a new era in agriculture was dawning, did indeed stimulate the juridical division. This, however, did not mean that large-scale reclamation was to begin right away. A lack of manure was one cause; having these lands still available for pasturing flocks of dung producing sheep another. It meant that many of the (former) commons still functioned as such for some decades to come. Large-scale reclamation of the *woeste gronden* (wastelands) would only come within reach after about 1900 when artificial fertilisers became available.²⁵⁰



Already at the beginning of the 16th century, the population density in the different regions of the Pleistocene parts of the Netherlands was far from being similar and in spite of later important demographical changes, this would be still the case in the early 19th century. These differences were also accompanied by striking differences in the social structure of rural population in the regions concerned, which can be seen from the division of farms and farmers according to their number of horses (Table 2.12). In Brabant, the number of farms with only one horse was much greater than in Drenthe. Moreover, typically for Brabant also were the so-called *osseboeren* – farmers who had relatively cheap-to-keep oxen for traction – particularly in the eastern parts of this province. In 1815, in the Eindhoven

²⁴⁷ Thissen, 'Heideontginning en modernisering', 1993, p. 265.

²⁴⁸ Van Zanden, *De economische ontwikkeling*, 1985, pp. 152-163; Bieleman, 'Boeren op het Drentse zand', 1987, pp. 223-228.

²⁴⁹ Demoed, 'Mandegoed', 1987; Heringa, 'De buurschap', 1982.

²⁵⁰ Compare: Thissing, 'Heideontginning en modernisering', 1993.

Part 2 – The period 1650-1850

Table 2.12. The relative number of farmers according to the number of horses in some sandy districts, in 1807.

	Number of farms with		
	1 horse	2-3 horses	≥4 horses
Drenthe			
Central- and Eastern-Drenthe	44	100 (= 1,335)	7
South-western-Drenthe	49	100 (= 623)	3
Overijssel			
Salland	99	100 (= 1,546)	5
Twente	169	100 (= 835)	1
Gelderland			
Veluwe	83	100 (= 1,565)	15
Graafschap Zutphen	132	100 (= 1,623)	3
Noord-Brabant			
The whole province	576	100 (= 2,033)	27
Sandy districts ¹	877	100 (= 1,052)	3

Source: National Archives, Den Haag, Gogel Collection, inv. no. 87.

¹ The whole province except the tax districts Oudenbosch, Breda, Geertruidenberg and Bergen op Zoom, these being districts with a prevailing marine clay component.

district, for instance, there were as many as 4,309 draft oxen compared to 3,362 horses; a ratio of 128 to 100!²⁵¹

Between 1650 and 1850 developments in farming and the rural economy of the distinguished regions of the Pleistocene part of the country were far from identical.



Although farming on the open-fields of the north-eastern sandy districts (Drenthe and Westerwolde) had experienced strong impulses from the expanding economy during the 16th and early 17th century, it had kept its character based on a low level of labour input and a broad-based, mixed setup. It offered farmers the opportunity to increase their output by employing more labour, as a part of a process of specialisation. Into the second half of the 17th century, breeding horses, slaughter cattle and wool had still been important sources of income (besides the cultivation of rye, of course) that provided farming with some stability against the fickleness of life. Afterwards, however, rye cultivation increasingly became the mainstay of the Drenthian farming system. This process of agrarian specialisation went along

²⁵¹ 'Statistisch tafereel', 1815.

2.5. Mixed farming in the sandy soil districts

with a process of economic specialisation as farmers disposed of many non-agricultural activities (weaving, tailoring, bread baking, house building, etc.) to have more time available for their strictly farming activities. It allowed a group of artisans to increase from a mere 5% of the total number of households during the first half of the 17th century via 12% in 1690 to 17% in 1740. At the same time, the increasing demand for (cheap) labour led to an important growth in the number of land labourers and small farmers. Their share in the total number of households increased from 26% in 1690, via 37% in 1740 to 46% around 1800.²⁵² In the parish of Rolde in the central part of Drenthe, for instance, the number of households forced to make their living on the margins of the farming community increased from 30 to 118 (Table 2.13).

The process of agrarian specialisation and intensification went hand in hand with a more intensive exploitation of the open-fields. The cultivation of these open-fields, formerly under a strong collective regime, acquired a much more individual character. The collective grazing of the stubble after the harvest of all the village's animals, for instance, was drastically reduced. It gave individual farmers better opportunities to battle the weeds and to manure.

At the same time, the manuring system of the open-field was strongly intensified, as farmers began to cut ever more sods from the common heather lands to be mixed with the animals' droppings and then – after being composted – brought onto the arable. From data concerning Anloo, a village in the north-eastern part of Drenthe, we know that the amount

Table 2.13. *The social structure in the central Drenthe parish of Rolde in 1672 and 1804.*

	1672	1804
A. Number of large farmers classified by their number of horses		
Four-horse farms	71	29
Three-horse farms	9	13
Two horse farms ¹	18	52
Subtotal	98 (index: 100)	94 (index: 96)
B. Number of other households classed by occupation		
Shopkeepers and artisans	21	46
Land labourers/small farmers	9	72
Poor	4	11
Subtotal	34 (index: 100)	129 (index: 379)
Total (A + B)	132 (index: 100)	223 (index: 169)

Source: Bieleman, 'Rural change', 1985, p. 112, Table 1.

¹ One-horse farms were rare.

²⁵² This whole process is elaborately described in: Bieleman, 'Boeren op het Drentse zand', 1987.

of sods that farmers were allowed to cut in the commons was extended from 8 cartloads per full share in 1684 to 24 in 1726 and then to 60 in the 1830's (Table 2.14). By doing so they were, in fact, bringing more nutrients from the wastelands to their much smaller area of arable land. In the early 19th century the *maire* (French for mayor) complained that some farmers in the community were used to cutting 80 or even more cartloads per full share where in former times only 6 had been allowed.

The specialisation process also took the shape of a drastic reduction in the number of cattle. In the early 17th century a modal holding would have about 24 heads of cattle as a contemporary document revealed. Yet, around 1800 numbers like these were only found very sporadically. From 1690 and even more so from 1740, the number of sheep gradually increased, now that their manure had become more important than their wool (Figure 2.6). In fact, cattle were replaced by sheep as manure producers. Sheep were indeed much better suited than cows to graze the coarse herbage the heather lands offered and they converted this food much more efficiently into dung than the latter (Map 2.6).

The process of intensification based on specialisation in the end indeed led to an important increase in productivity. In the early 17th century it was reported that rye usually produced a three-fold of its seed and only in very good years a four-fold; historians talk about a yield ratio of 1:3 or 1:4. During the early 19th century, however, the yield ratio of

Table 2.14. The setting of the shares concerning the quantities of sods allowed to be cut, the number of sheep and the number of cattle per full share (or converted to full share) in the village of Anloo (North-western-Drenthe), in 1632-1840. In 1645 Anloo had 15 full shares.

	Number of cart loads of sods of heather	Number of sheep	Number of cattle
1632	.. ^a	40	26
1669	.. ^a	52	26
1684	8	.. ^a	.. ^a
c. 1700	8	52	16
1726	24	52	12
1729	24	52	12 ^b
c. 1830/40	60	.. ^a	8 ^c

Source: Bieleman, 'Boeren op het Drentse zand', 1987, p. 613, Table 6.11.

^a No regulations were made on this item.

^b Plus 2 heads of young cattle.

^c Plus 4 heads of young cattle.

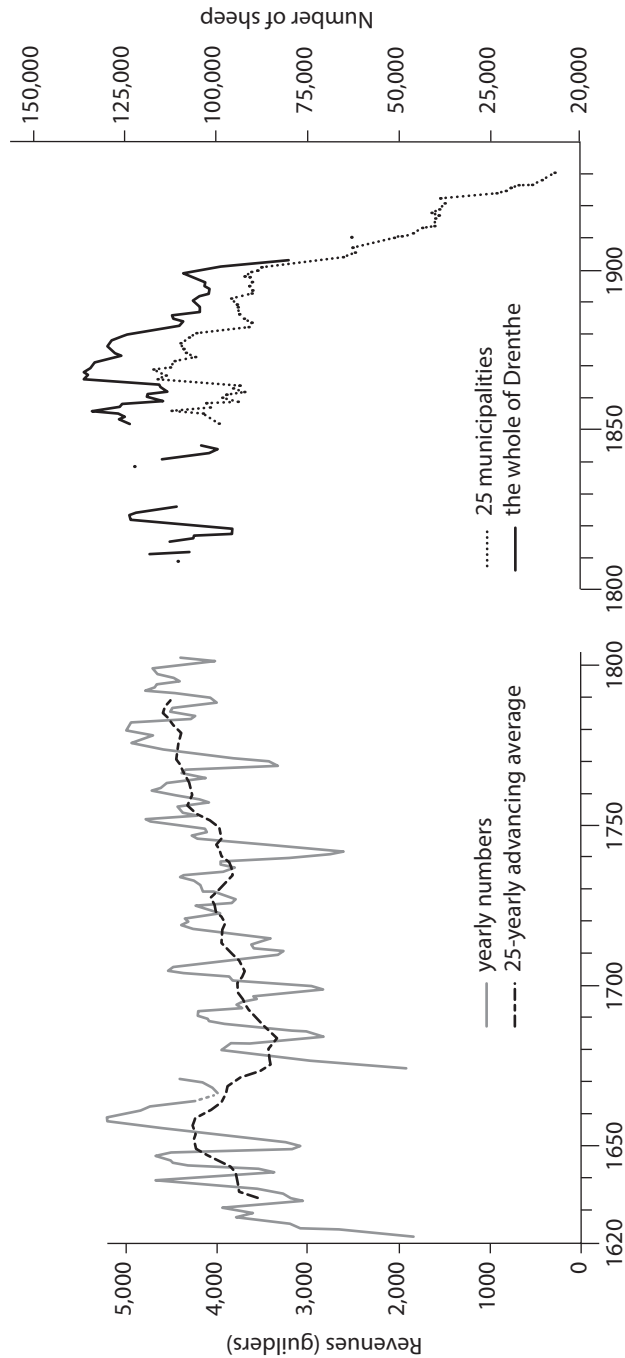
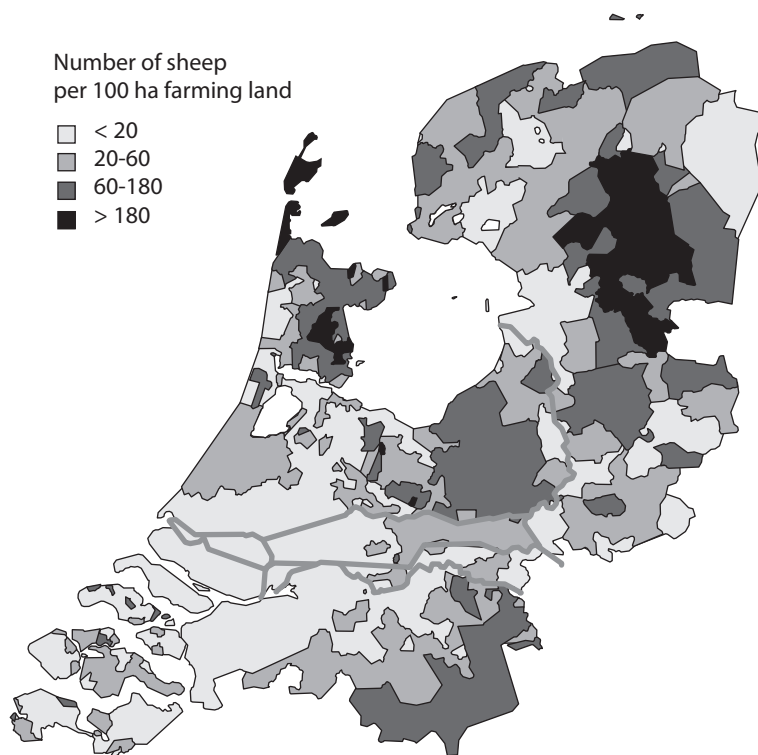


Figure 2.6. The size of the sheep stock in the province of Drenthe, 1622-1910/30.

The left part of the graph is based on the revenues of the impost on sheep; the right part indicates the actual numbers of sheep. The frequent and sometimes heavy fluctuations in the graphs are effected by occurrence of liver fluke epizootics, which caused sheep (as well as cattle and horses) to perish in masses. After: Bieleman, 'Boeren op het Drentse zand', 1987, p. 443 graph 5.25 and 5.26.



Map 2.6. Sheep densities in the Netherlands in 1811.

The number of sheep per 100 hectares of farming land. The values are based on figures per municipality, except for western Brabant (per canton), and parts of Zuid-Holland and Groningen (per district). Not included: Limburg. Source: Databank Rural History Group WUR.

rye had increased to 1:6 or even 1:8. Expressed in metric measures one can calculate that yields rose from about 700 - 850 to 1,200 - 1,300 kg/ha.²⁵³

In the central parts of Drenthe, on the open-fields, rye indeed continued to be the farmer's most important crop by far. However, in the adjacent parts of the vast Bourtanger Moors in the province of Groningen, large parts of the remaining peat bogs were used for a special form of husbandry called *veenbranden* (moor burning) to produce a special variety of buckwheat, *veenboekweit* (moor buckwheat). On these vast moors the top layer of the peat was burned off and buckwheat was sown immediately afterwards into the ashes. During its peak years around 1870 almost 8,000 ha (two thirds of the national total) of these moors were cultivated this way, turning them into an endless sea of white flowering plants during the summer. The success of the culture, however, was very uncertain, as moor buckwheat –

²⁵³ Bieleman and Roessingh, 'Wie zaait zal oogsten?', 1994.

2.5. Mixed farming in the sandy soil districts



Illustration 2.11. The bee market near the village of Veenendaal (province of Utrecht) in 1931.

Once bee keeping was an important activity in symbiosis with buckwheat cultivation in the sandy districts of Utrecht, the western Veluwe and the Gooi-district of Noord-Holland. From the end of the 19th century, however, when buckwheat cultivation rapidly lost its importance, the significance of bee markets also decreased. Source: Collectie Spaarnestad, photo/ANP

like normal buckwheat – was very sensitive to night frost. It was for this reason that farmers nicknamed the crop *jammerkoorn* or misery grain.



A striking feature in the history of farming in the central and eastern sandy districts during this period was the expansion and spread of tobacco cultivation, especially in the Veluwe district, more particularly in the western parts. During the secular depression that began in 1650, this crop proved to be of extraordinary significance for many farmers, small farmers and land labourers. The cultivation of tobacco – an exotic crop – had been introduced during the first decades of the 17th century, at the instigation of Amsterdam tobacco merchants and tobacco manufacturers. They saw inland production as a source for their stockpiles which they needed in order to influence the price of overseas tobacco leaf on the Amsterdam market. The first onset began around the towns of Amersfoort and Nijkerk, soon evolved into true tobacco centres.

Tobacco husbandry was performed in share cropping systems, reducing business risks for small farmers. Landlords often took care of the supply of manure, handed out advances and



Illustration 2.12. Harvesting of tobacco leaves on a painting by the Dutch artist Tjarda van Starkenborgh (1822-1895).

The picture shows clearly that the individual tobacco plants are deeply topped. By taking away the upper part of the stem and its flower truss all nutrients that the plant took up benefited the leaves that then grew heavier, thicker and broader. Topping was a technique that was introduced in tobacco cultivation in the early-17th century. The leaves were plucked one by one, very carefully. Painting Douwe Egberts BV, Utrecht.

finally took care of the sales of the product. Because of this, small farmers, land labourers and artisans with little or no financial reserves were perfectly well able to participate in production. However, for larger farmers too, the burden of high taxation and low grain prices made it attractive to grow a certain area of tobacco, or have it done by their labourers and their families in share cropping. Under these circumstances tobacco cultivation expanded rapidly during the second half of the 17th century.

The application of techniques adopted from horticulture was typical of the way tobacco was grown here, using, for instance, hot beds to germinate the seed to facilitate an early season start. Around 1660 special drying sheds were introduced, equipped with sides containing hatches to regulate the drying process. Already before 1690 these drying sheds were being widely used in the region. Besides their traditional sheep dung (mixed and composted with sods of heath), increasing quantities of sheep manure were being imported all the way from Holland, Zeeland, Friesland and Groningen, as well as pigeon dung, a speciality, from Friesland, to manure the demanding crop.

2.5. Mixed farming in the sandy soil districts

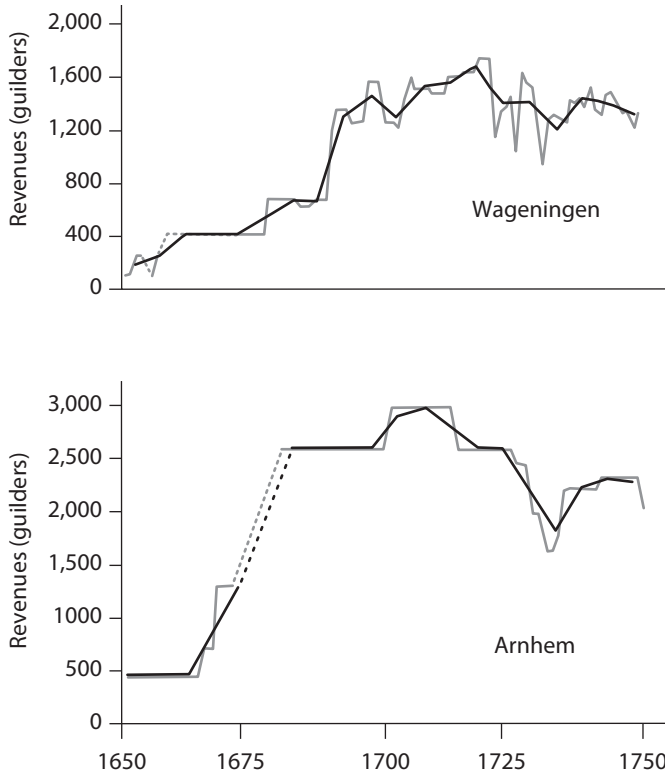


Figure 2.7. Expansion and contraction in tobacco cultivation in the Veluwe region, 1650-1748. Both graphs show the revenues of the leasing-out of the tobacco weigh house in the towns of Wageningen and Arnhem, indicating the actual supply of tobacco in both weigh houses (grey lines: annual figures; black lines: 5-year moving average). After: Roessingh, 'Inlandse tabak', 1976, p. 217 graph 4.2 and 4.3.

The period shortly after 1700 was the heyday of inland tobacco leaf production (Figure 2.7). In the Veluwe district alone at least 1,700 ha were planted with the crop by about 2,000 tobacco growers. In less than ten years production had risen sensationally by more than 50% from c. 10 million pounds around 1700 to 15-18 million pounds around 1710 (Table 2.15). Calculating its value in money it was of a similar order to the total cheese production in Noord-Holland in those days!²⁵⁴

From 1720 onwards a certain contraction occurred, as production concentrated around a few specific places, like Nijkerk and Amersfoort. Around these towns tobacco cultivation was known for its high standards and of old a lot of money had been invested in establishing drying sheds. Because of their favourable geographical location production in these centres was even expanded a little.

²⁵⁴ Roessingh, 'Inlandse tabak', 1976; *idem*, 'Tobacco growing in Holland', 1978.

Part 2 – The period 1650-1850

Table 2.15. The annual production of inland tobacco and the imports of British colonial tobacco in the Netherlands, in 1675-1852. Approximate figures in millions of Amsterdam pounds.

	Inland production	British colonial exports into the Netherlands
c. 1675	5-6	4
c. 1700	9-10	8
c. 1710	15-18	7
c. 1730	8-10	10
c. 1750	11-12	17
1771/75	7	28
1778/79	12	— ^a
1810	9	— ^a
1814	7	— ^a
1852	5.8	— ^a

Source: Roessingh, 'Inlandse tabak', 1976.

¹ One Amsterdam pound \approx 0.494 kg.

^a No data available.

However, because of sharpening competition from cheaper tobacco coming from elsewhere in Europe, and even more so from British colonial tobacco, Dutch inland tobacco was increasingly pushed out of the market. Between 1760 and 1775 production was reduced significantly. Only during the American War of Independence, as supply from across the ocean stagnated and European prices suddenly ran up, was there a striking recovery; as happened in the Batavian/French period. Around the middle of the 19th century all across the province of Gelderland about 1,250 to 1,500 ha of tobacco were grown and in Utrecht another 400 ha. Generally, tobacco as a crop was replaced not only by rye and buckwheat, but – and especially so – by potatoes.



In the southern sandy districts, south of the river clay district, in the course of the 16th century the contours of farming system silhouetted which was much more (labour) intensive than the ones elsewhere in the sandy districts. By then, important parts of this region had already developed as butter producers. And this orientation must have been rather beneficial to the farmers here during the secular depression between 1650 and 1750. It is true, of course, that their butter was of much inferior quality than the product from Rijnland (around the town of Leiden), Delfland (around Delft), or Friesland, but it was also cheaper.

2.5. Mixed farming in the sandy soil districts



Illustration 2.13. Farmers' wives bringing their butter to the market in the village of Gemert (province of Noord-Brabant), around 1914.

Source: Nederlands Openluchtmuseum, Arnhem.

The latter enabled the farmers to sell it on the internal market in particular. Their colleagues from the grassland districts had focussed on exporting high-quality summer butter and were forced to curb their production because of the worsening economic situation.

The higher added value of butter in relation to arable products like rye and buckwheat offered an excellent opportunity to capitalise on the potential of cheap labour that was available on the small family farms, here. The increasing importance of butter sales appears also from the fact that in many places butter auction markets were established during the 18th century. There, farmers could offer their butter for sale to butter traders. At the end of that century, butter was reported to be an *important artikel voor de Meyerye*, as it was exported in hundred thousands of pounds to Holland.²⁵⁵

The orientation towards butter production had been possible because the by-product of butter, buttermilk, was fed to the farm animals, especially pigs, to fatten them. When these pigs were heavy enough, they were slaughtered and their best parts – the hams – were sold

²⁵⁵ Adriaansen, 'Hilvarenbeek', 1987, p. 98; Van den Eerenbeemt, 's-Hertogenbosch', 1955, p. 9.

to be exported. Elsewhere – that is to say along the north-western fringe area of the Brabant sandy region and in the Meierij – farmers used the whole milk from the couple of dairy cows they kept to fatten calves. Once these calves were fattened up to about 100 or 150 kg, they were sold and transported to Holland or Brussels – preferably by water in order to lose as less weight as possible or simply because the young animals were no longer able to walk by themselves.²⁵⁶ Deeper down in Brabant's Southeast, production of butter became more prominent, in combination with the sale of rye and buckwheat.

At the basis of this labour intensive husbandry lay the arable and the cultivation of spurrey, and later on turnips and red clover. In the sandy parts of Brabant the cultivation of clover occurred mainly in places where there was relatively abundant grassland. There it was cultivated in combination with well-manured oats or barley as a nursing crop. After this crop had been harvested a very nourishing (temporary) pasture remained the second year, which was sometimes continued for a third year. Yet, it would not be until the late 18th century that this method became widespread. In 1810 the Agricultural Commission of Brabant reported: *L'introduction des ces prairies* (the commissioners meant these clover sown artificial grasslands) *dans ce département a remonté à l'année 1780*.²⁵⁷ Likewise in the river clay district, it was probably the growing economy in the last decades of the 18th century that stimulated the increase in the number of cattle. The latter will have stimulated – or rather necessitated – the cultivation of this fodder crop on the smaller farms in particular.

Probably simultaneously, the system of stall feeding was perfected, to become a system of (almost complete) 'zero grazing', as even in summer cattle did not come outside, or hardly at all. As a result, most of the animal droppings could be saved and used productively as manure, as the high-grade fodder must have contributed importantly to its qualitative constitution. In the Breda district it was reported in 1800 that cattle was pastured two times a day for about three hours.²⁵⁸ Elsewhere in the region, it would stay indoors for the whole summer.

Thanks to this system of stall feeding, farmers in Brabant were able to produce a strikingly regular supply of butter to the auctions.²⁵⁹ Elsewhere, i.e. in the traditional dairying districts, dairy production was still concentrated in the pasturing season. First of all, however, it was a farming system that required an extraordinary amount of labour, specially focussed on the production of manure, to be able to fertilise a relative large area of arable. Very typical is the way in which the latter was depicted by contemporary publicists who described the dedication of the Brabant farmer and his family to 'his second God': manure.²⁶⁰

²⁵⁶ Van Iterson, 'Schets', 1868, p. 79; Van der Poel, 'De landbouwenquête', deel 2, 1954, p. 86.

²⁵⁷ Provincial Archives of Brabant ('s-Hertogenbosch), Bestuursarchieven 1795-1814, inv. no. 1476.

²⁵⁸ Van der Poel, 'De landbouwenquête', deel II, 1954, p. 59.

²⁵⁹ Van der Heijden, 'Boterhandel', 1989, pp. 110-113 and 125.

²⁶⁰ Van Iterson, 'Schets', 1868, pp. 56-73 and 149.

Part 3 – The period 1850-1950
New markets, new opportunities

3.1. Introduction

Around 1850 Dutch agriculture entered a completely new era. One of the factors that clearly stimulated farming to change thereafter was a rapidly growing population. As from the middle of the 18th century population growth all over Europe had speeded up. From 1750 to 1850, the number of Europeans had grown from 94 million to 177 million in 1850 and eventually 314 million in 1950.²⁶¹ Yet, the speed with which populations grew was not the same everywhere. In the Netherlands this trend only from the early 19th century. In 1795, this country still only had 2.1 million inhabitants (almost as many as around the middle of the 17th century) and this number increased to 3.0 million in 1850. Subsequently, the number of Dutch people grew to 5.2 million in 1900 and eventually in 1950, there were 10.2 million.

In general, population growth went hand in hand with a complex and comprehensive process that has become known as the Industrial Revolution. At first and above all in Great Britain, it went along with a process of industrialisation and an explosive and unprecedented increase in urban population: many people now had to find their living outside agriculture. Around 1850, in Britain only 22% of the labour force still worked in agriculture; yet in most other countries this share was still as high as about 50%. In Britain, their absolute numbers were also constantly falling, while in other countries the number of people involved in agriculture continued to rise for at least some decades (Table 3.1).²⁶² In the Netherlands 44% of the working population worked in agriculture, in 1850. Between that year and 1950

Table 3.1. Agrarian workforce and its share in the total population in 6 countries in north-western Europe in 1850, 1900 and 1950, in thousands.

	1850		1900		1950	
	abs.	in %	abs.	in %	abs.	in %
Great Britain	2,054	22	1,476	9	1,142	5
Germany	-	-	9,883	37	7,193	23
France	7,305	52	8,245	41	5,195	27
Belgium	1,023	51	865	27	425	12
Denmark	654	54	531	47	518	25
The Netherlands	552	44	592	31	747	19

Source: Mitchell, 'European historical statistics', 1975, p. 153-156, 159 and 163.

²⁶¹ De Vries, 'European urbanization 1600-1800', 1984.

²⁶² Compare for instance: Grigg, 'The dynamics of agricultural change', 1982, pp. 101-117.

their absolute numbers continued to grow from 552,000 to 747,000, i.e. 19% of the total labour force (Table 3.2).

Apart from a fast growing population and therefore an increase in demand, there was another factor that had a major impact on the developments in agriculture in this period. Along with the process of population growth, the average income of the Europeans rose, at first slowly but then more rapidly, giving people more freedom to spend their money on goods other than the bare necessities and basic foodstuffs. In other words, after a long period in which their daily diet had consisted to a great extent of carbohydrates, they now had more room for more 'luxury' foodstuffs, that is to say for a diet that contained more protein and fresh produce. In practice, it meant a growing demand for meat, dairy products and eggs, but also for more vegetables, fruits, sugar, flowers, etc. And like nowhere else, it was Dutch farmers and horticulturists who capitalised on this changing market.²⁶³



More directly, however, there were two other developments that profoundly changed Dutch agriculture after 1850. First came the rapidly increasing agricultural prices. After the mid-19th century, the increase in agricultural prices, especially those of livestock products and horticultural products, was of course the effect of a rapidly growing population and a flourishing economy in the industrialising neighbouring countries, with Britain at the fore. As a result, the British government had decided to abandon restrictions on imports, more specifically the imports of agricultural products to avert shortages in the domestic market. This was especially the case after the potato blight had destroyed the potato harvest and food prices had rocketed in 1845. It was for this reason that this country repealed its Corn Laws, a system of import levees meant to protect British grain producers from large-scale imports. Other countries soon followed which led to a liberalisation of international trading and a new regime of free trade that spread all over Europe. The abolition of import

Table 3.2. Working population in agriculture and its share in the total Dutch labour force, in 1849, 1899, 1947 and 1995, in thousands.

	× 1000	in % of total labour force
1849	552	44
1899	592	31
1947	747	19
1998	207	3

Source: Mitchell, 'European historical statistics', 1975.

²⁶³ Bieleman, 'Dutch agriculture', 1996.

restrictions meant that important products became relatively cheaper, which, in turn, stimulated demand.

Dutch livestock farmers were not the only ones to benefit from this increasing demand from abroad. Arable farmers in the province of Zeeland, for instance, profited from an increasing demand for their madder again. Exports of flax, oats, potatoes and potato starch grew as well and for the farmers in the sandy parts of the country, particularly, the 'price revolution' after 1850 led to a fundamental shift in their farming system. Without a doubt, however, it was the horticultural sector that benefited most from the prospects that foreign markets (read: British markets) offered (Figure 3.1). It is calculated that the share of horticultural products in the whole of agricultural exports increased from only 2% in 1846 to as much as 17% in 1926. At that time, exports formed a substantial part of total Dutch agricultural production. It is estimated that on the eve of the First World War about half of the total national production was exported; others think that this share may actually have been even higher.²⁶⁴

Another and second, decisive element that had a major impact on Dutch agriculture was the technical changes in transport which drastically reshaped the economic geography of Europe and its relations with other parts of the world. Big steam vessels transported goods

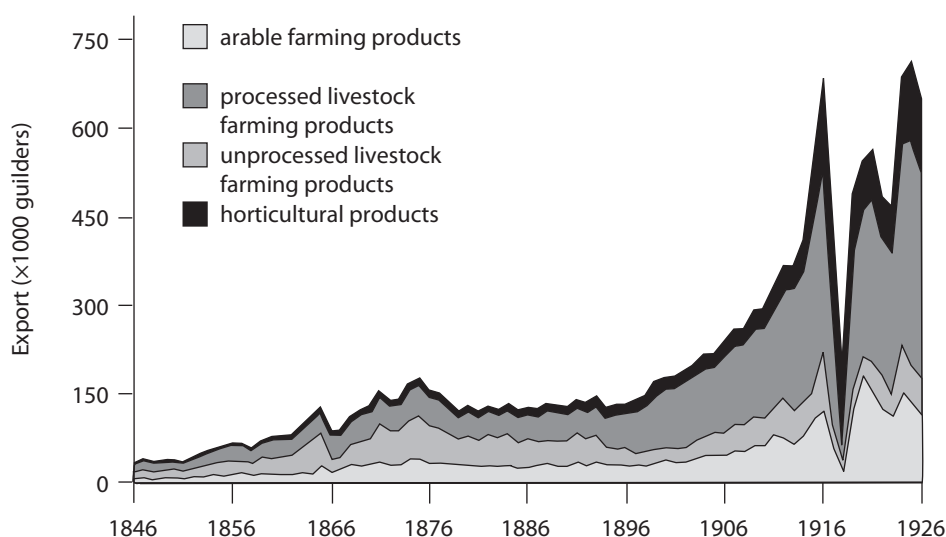


Figure 3.1. The exports of agricultural and horticultural products at current prices (guilders), 1846-1926. After: Pilat, 'Dutch agricultural export performance', 1989, p. 3, Table B6; Bieleman, 'Dutch agriculture 1850-1925', 1996.

²⁶⁴ Pilat, 'Dutch agricultural export performance', 1989, p. 3, Table B6; Knibbe, 'Agriculture in the Netherlands', 1993; Bieleman, 'Dutch agriculture 1850-1925', p. 42.



Illustration 3.1. The SS Heron loaded with casks with butter and slaughtered pigs (c. 1920).

From the second half of the 18th century onwards the Friesian port of Harlingen grew into a major export port for butter, intended for Britain in particular. In the 1920's this ship sailed once a week to London. Source: Gemeentemuseum Het Hannemahuis, Harlingen.

faster, far more reliably and more cheaply. Many new, regular shipping lines were established connecting the Netherlands with overseas countries. In the interior the set-up of a national network of canals energetically taken up in the first half of the 19th century was further expanded and followed by the emergence of a national railway system. Between 1850 and 1890 the length of the national network increased from 176 km to 2,160 km.²⁶⁵ Later on, especially in the inland provinces, this railway system was supplemented by a refined network of smaller regional lines and steam tram lines. Together, they afforded easy access to the new and rapidly growing markets outside the country (and, in turn provided farmers with all sorts of basic goods, such as fodder, concentrates and fertilisers).

In fact with its focus on markets abroad with Britain initially first in the queue, and facilitated by the immense changes in the field of transport, the Netherlands found itself in the classic position of a peripheral economy: for a long time the exports of agricultural products were to be counterbalanced by imports of all kinds of industrial goods. In a way, the focus of the 'Thünensian' field of force that had spread over north-western Europe

²⁶⁵ Knibbe, 'Agriculture in the Netherlands', 1993, p. 133 Table 5.4.

ever since the Late Middle Ages, was virtually shifted from the conglomerate of Dutch towns (Amsterdam at the front), across the North Sea to London. While the population of Amsterdam – the Netherlands' largest city then – still amounted to fewer than 225,000 people. Greater London already had more than 2.5 million inhabitants in 1850. The fact that Dutch agriculture focussed on the export of its products abroad in this period, has been seen as one of the reasons why the national economy, modern as it was, kept its prevailing agrarian nature for so long. And this was reflected by the relatively large share of the professional population employed in agriculture.

At first, the British were indeed the best customers. G.J. Hengeveld, one of the leading authorities in the field of livestock farming and in 1865 the author of the standard work *Het Rundvee* (*Cattle*) called the British export market 'a bottomless pit which can never be filled'.²⁶⁶ After 1890 however, exports streams were flowing quite differently and by the 1920 the Germans had become the most important buyers by far. By that time, 35% of the most important products were sold to Germany.



Agriculture can be seen as 'applied ecology'.²⁶⁷ For a long time, the knowledge of how to master the complex reproduction processes of plants and animals that formed the basis of agricultural production rested on the skills of the farmer. These skills were his guideline when managing his business, and they were based on the accumulated experience of former generations, as well as his own. All this was to change rapidly during the second half of the 19th century, especially after 1890. One of the major and most striking aspects of the process of change in agriculture was the far-reaching extent of scientification of this sort of knowledge, making the new era fundamentally different from the one before. New, rapidly evolving agricultural sciences not only discovered many of the biological principles and processes behind plant and animal production, and learnt how to control them; farm management and all that was related to it also became a subject of scientific research.

In the Netherlands alone, the number of publications in the field of agricultural science increased from tens to thousands annually. In the period 1900-1976, the number of reports on agricultural research in the Netherlands doubled within 21-22 years. At first, most research concerned biological techniques, especially in plant production. Much research focused on the question of how to increase plant production per hectare, and a discipline like plant breeding contributed importantly to that. New cultivars, adapted to the rapidly increasing amounts of fertilisers that were being used, were rapidly replacing the traditional landraces in a very short time.²⁶⁸ After the Second World War, a greater part of agri-scientific

²⁶⁶ 'Een bodemloze put die nooit gevuld kan worden.' Hengeveld, 'Het rundvee', 1865, vol 2, p. 114.

²⁶⁷ Zadoks, 'Landbouw tussen oecologie en economie', 1985, p. 377. The full definition Zadoks gave, runs as follows: 'Agriculture is a kind of applied ecology and is subject to the laws of physics, chemistry and biology. It seeks to apply these laws for economic purposes. Agriculture is also a part of the social order and therefore subject to social developments in general and economic developments in particular'.

²⁶⁸ Maltha, 'Honderd jaar landbouwkundig onderzoek', 1976, p. 172; Bieleman, 'Tarweteelt en tarweveredeling', 2002.

research was dedicated to animal production, particularly in the field of cattle breeding, fodder production and grassland management.



The focus on exports, facilitated by a regime of free trade and new ways of transport systems, had generated a true revolution in prices, ever since the middle of the 19th century. However, partly because of the same elements that had played a catalysing role in the thriving developments after 1850, the economic situation had already changed for the worse in less than three decades. Ever faster and bigger steamships were bringing growing quantities of grains and other agricultural commodities from the ‘New World’ to Europe, flooding European markets. In the years 1861-70 the annual supply of wheat from the USA and Canada had still amounted only 22 million bushels (at 0.35 hl); twenty years later this had increased to 140 million bushels in the years 1880-84.²⁶⁹

The result was that around 1880, due to the increasing supply from outside Europe, the increase in agricultural prices which had begun around 1850, quite abruptly came to an end. And in the longer term grain prices especially were to remain (relatively) low, especially when compared to prices of livestock products (Table 3.3). The effect was that European consumers still had more financial freedom to spend more on ‘luxury’ agricultural products, a trend that had begun earlier, but this spending power was now boosted considerably.

Table 3.3. The index of the price of butter and of wheat (respectively in Leeuwarden [Friesland] and in Groningen [Groningen]) 1831-1910.¹

	Butter	Wheat
1831-1840	91	84
1841-1850	100	100
1851-1860	123	127
1861-1870	145	113
1871-1880	166	116
1881-1890	145	86
1891-1900	126	66
1901-1910	141	73

Source: Priester, ‘De economische ontwikkeling,’ 1991, bijlage 5.1; Hylkema, ‘Leerboek,’ 1913, pp. 620-621.

¹ Index: 1841-50 = 100.

²⁶⁹ Tracy, ‘Government and agriculture,’ 1989, p. 18.

The ‘great depression’ was – as far as agriculture was concerned – primarily a crisis in arable farming: between 1871-80 and 1891-95 Dutch wheat prices fell to 54% of their former level. Yet, the livestock farming sector also suffered from falling prices, like those of cheese and butter in particular. The latter, however, was particularly due to the effect of competition problems on the British market and the arrival of a much cheaper substitute: margarine. Farmers on the sandy soils of the interior provinces still did rather well for some time, thanks to the pig fattening side of their mixed farming system. As appears from the development of rents, arable farming on the sandy soils in the *Veenkoloniën* (peat colonies) kept on going rather well. The rapidly expanding horticultural sector did not suffer much from the depression either (Table 3.4).

Unlike the crisis in the years 1817-45 the workers that were deployed in agriculture were now able to find a job fairly easily elsewhere in the economy as the Netherlands was rapidly industrialising after the 1890’s, catching up with the slow progress it had made up to this point.

For a long time the historiography of 19th-century agriculture depicted the ‘great depression’ of the 1880’s and 1890’s merely as a ‘cyclical economic’ problem, caused by the sudden and increasing flow of grain coming from the New World to Europe causing grain prices to fall. Much less attention was given to the great, complex structural changes behind this crisis, namely the fundamental changes in the world’s transport-geographical relations and the spatial (re-)organisation of the agricultural production that went along with it, and – very important! – the piecemeal shift in the daily diet of the Europeans. Grain prices not only fell, but due to this remained low, offering consumers even more room to spend a larger part of their income on more luxury food products.

Table 3.4. *The relative rent in 5 groups of farming districts, in the period 1881-85-1912.*

	1881- 1885	1886- 1890	1891- 1895	1896- 1900	1901- 1905	1912
Arable/mixed farming on the marine clay soils	100	86	85	82	91	113
Arable/mixed farming on river clay soils	100	89	88	83	90	106
Livestock farming	100	90	88	87	97	118
Mixed farming on sandy soils	100	90	97	105	111	193
<i>Veenkoloniën</i> ¹	100	95	110	111	125	154

¹ Arable farming on sandy soils.

Source: Van Zanden, ‘De economische ontwikkeling’, 1985, p. 121 Table 6.7.



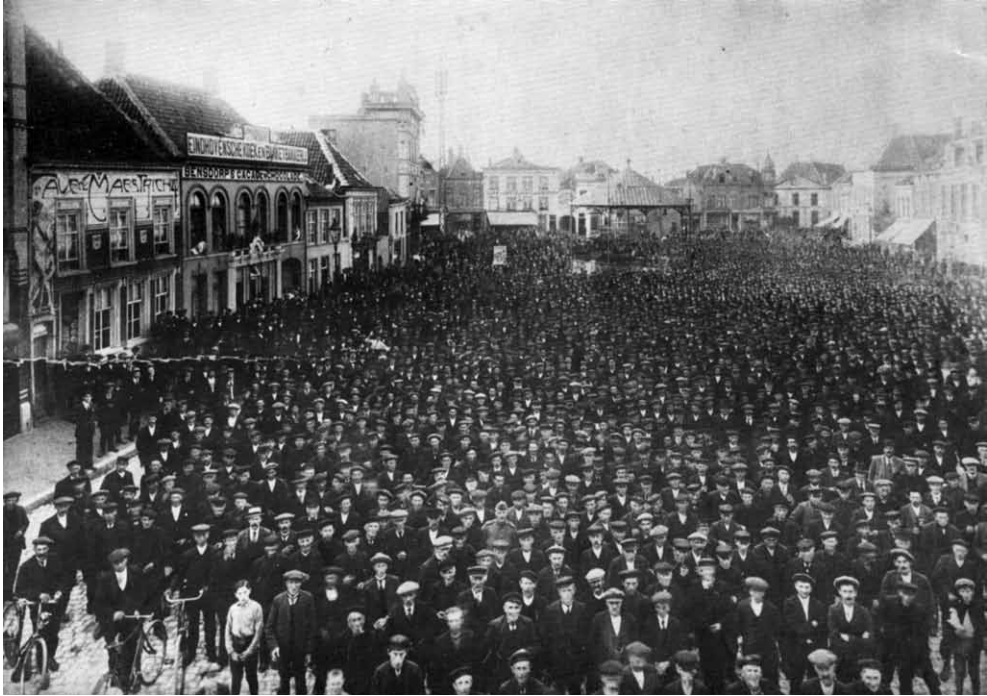


Illustration 3.2. Farmers protest against the compulsory delivery of rye to the government (1917).

In September 1917, on the initiative of the farmers' societies more than 5,000 farmers gathered in the town of Eindhoven to protest against the compulsory delivery of rye to the government that had been proclaimed shortly before. The obligation caused complete disruption in the management on the mixed farms in the sandy districts where farmers produced their rye, oats and potatoes to feed to their livestock (cattle, pigs and poultry). Source: Regionaal Historisch Centrum Eindhoven.

The prosperous developments in agriculture that subsequently began around 1900 were part of a general revival of the economy. Soon, however, they would be interrupted by the outbreak of the First World War. And although the Netherlands did not actively get involved in war activities, the situation had far-reaching consequences for the economy and for farming in particular. The import of all kinds of animal fodder and fertilisers was cut off and because the supply of bread grains had also stopped, inland production had to be reorganised urgently.

After the war had ended, in 1918, the economy rapidly recovered and flourished. In the course of the 1920's however, the situation began to change. The young and flourishing agricultural sciences helped improve productivity and increased production, slowly but unmistakably leading to a situation of over-production, in arable production as well as in livestock farming. World market prices fell. New and fast refrigerated ships supplied the European markets with butter from New Zealand and Australia in bulk, while high quality margarine was produced in ever-growing quantities. Already in the course of the 1920's

price levels had decreased so much that farming was barely profitable any longer. From 1927 onwards, the income per man-hour of Dutch farmers fell below the level of what farm labourers were paid that time.²⁷⁰

At first, the government abstained from any interference, maintaining its liberal political course. However, when the situation deteriorated drastically in 1931, it began an ambitious program to support the agricultural sector to save it from virtually inevitable collapse. Consequently, in 1931, the first steps were taken towards what would eventually become a comprehensive and complex agricultural-crisis policy (see below). Much was done to improve the quality of farming and farming production in an attempt to consolidate and improve the position of Dutch agricultural products on the export markets and consequently the income of farmers and horticulturists.

Looking at the various types of farming in the Netherlands, the one that suffered most was mixed farming in the river clay district. Farmers there seemed to have been unable to keep up with the wave of intensification and improvement that had changed farming in the other farming districts of the country so much, since the late 19th century. Here, in the financial year 1931-32 results were deeply negative: the average income per hectare fell to -99.60 guilders. The potato farmers in the *Veenkoloniën* district were also badly hit now as they suffered from the rock-bottom prices of potato starch on the world market. In fact, arable farmers in the marine clay districts in the north and in the southwest suffered the least, although their results were also negative during that year (Table 3.5).

Until 1937, the overall situation in Dutch farming remained troubled. Finally that year, the annual report on the state of agriculture in the Netherlands read: 'Meanwhile, it may be

Table 3.5. The average revenues (labour income of the farmer's family) in 5 groups of farming districts in the financial year 1927-28, 1931-32 and 1936-37, in guilders per ha.

	1927-28	1931-32	1936-37
Arable/mixed farming on the marine clay soils	20.90	-48.33	59.07
Arable/mixed farming on river clay soils	-6.24	-99.60	43.85
Livestock farming	23.91	-66.64	57.73
Mixed farming on sandy soils	22.35	-82.16	60.38
<i>Veenkoloniën</i> ¹	65.78	-86.72	43.31
The Netherlands	23	-73	57

¹ Arable farming on sandy soils with potato cropping.

Source: 'Verslag over den landbouw' over 1932, p. 79; 'Verslagen en mededeelingen van de Directie van den Landbouw' 1938 no.2, p. 17.

²⁷⁰ Van den Noort, 'Omvang', 1965, p. 113.

said that after a string of tough years, the financial year 1936-37 has been a relief for most farmers.²⁷¹

In May 1940 the Netherlands became involved in the Second World War and the government was faced with the almost impossible task of bending a surplus economy into an economy of scarcity. A policy of production restraint had to be replaced by one to stimulate production. Cut off from the outside world, a full restructuring of agricultural production was needed. Measures were taken to ensure that food supply to the population was at least quantitatively guaranteed, although this implied a qualitatively lower level by necessity. This meant more carbohydrates, less protein and less fat. During the first year of the war the stocks of pigs and poultry had already been cut back to an absolute minimum. Cattle stocks were maintained fairly well at their numbers after a small reduction. In arable farming the area of grains and potatoes was increased, and the area under coleseed (an oil producing crop) was expanded considerably.

It has been demonstrated that overall agricultural production did not decline to the extent official production statistics then suggested (except for the last year of the war, of course).²⁷² Much of the 'extra' production, however, 'disappeared' to reach a large part of the consumers through all kinds of informal supply networks.

Of course, all kinds of war time activities caused great damage to agriculture, especially during the last year of the war: almost 9,000 farms were destroyed and another 6,000 severely damaged (about 8% of the total particularly in the southern provinces); a substantial part of the livestock perished. In horticulture more than 2.5 million m² of glass were destroyed and 244,000 ha of land was inundated of which almost 69,000 with salt water, particularly in the provinces of Zuid-Holland and Zeeland.²⁷³ Yet it was clear how extraordinarily the sector had performed during the war years, succeeding in feeding the Dutch population adequately under unusual and very difficult conditions.²⁷⁴

The focus on foreign markets and the specific changes in agriculture connected with it, had greatly encouraged small farming, as much in horticulture as in the mixed farming system as it developed in the sandy parts of the country. Small farming, or more specifically, family farming prospered, a process that had begun about 1850 but accelerated after the 1890's. The increasing profitability of labour-intensive farming systems generated a tendency that benefited family farming.²⁷⁵ From the outcomes of agricultural censuses held in the early 1950's it appears that in the sandy districts in particular the percentage of total number of man work units per year performed by the farmer and his family increased by 90% (Map 3.1).²⁷⁶ It was the result of, developments strongly fostered by an emerging active agricultural policy by the national Dutch government after the late 19th century.

²⁷¹ 'De economische toestand', 1938, p. 16.

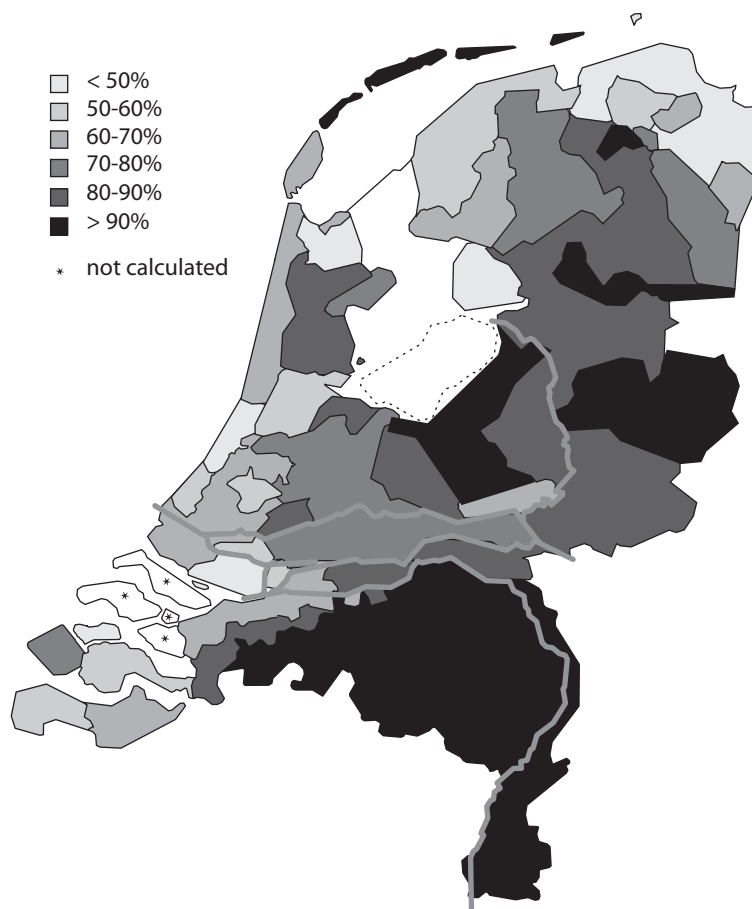
²⁷² Trienekens, 'Tussen ons volk', 1985.

²⁷³ 'Verslag van de landbouw' over 1942 t/m 1945, pp. 136-154.

²⁷⁴ Trienekens, 'Tussen ons volk', 1985.

²⁷⁵ Koning, 'Agrarische gezinsbedrijven', 1982-83; Van Zanden, 'De economische ontwikkeling', 1985, pp. 326ff.

²⁷⁶ Lijfering, 'De omvang', 1959.



Map 3.1. Family farming in the Netherlands in 1953.

The map shows the percentage of the total number of man work units per year in agriculture and horticulture performed by the farmer and his family per agricultural district in 1953 (the Dutch average is 76%). After: Lijfering, 'De omvang', 1959, Map VI.

3.2. 'Den Haag' and the farmer: government and agricultural organisations

Apart from a short period during the Napoleonic era the Dutch government had left developments in farming (almost completely) to the vagaries of free economic forces for a long time. However, as the liberal climate culminated in the 1840's and 1850's, private initiative took over and regional agricultural societies were established, one in every province. These societies organised meetings, exhibitions, competitions, published brochures, and journals, all as attempts to increase the knowledge and the use of new agricultural technology and to improve the understanding of them by carrying out experiments. After about 1865 and following the German example, some of these societies began to appoint agricultural advisers in their districts, and soon these functionaries appeared to be successful. The *Verslag van den Landbouw* (the Annual National Agricultural Report) for 1873 stated: 'The giving of lectures by competent experts for local societies of farmers is increasingly seen as an excellent way of spreading agricultural knowledge.'²⁷⁷ Generally, these societies were initiated by members of the aristocracy and by gentlemen farmers and they initially set the tone, with a sometimes quite naïvely optimistic belief in their theoretical knowledge of agriculture. However, quite soon ordinary farmers joined them and between 1850 and 1880 the number of members in these organisations increased from about 10,000 to between 25,000 and 30,000. To place these figures in some perspective, at that time there were about 100,000 farmers with at least one horse in the Netherlands. Of course, one cannot weight these figures in the same sharp way, but they, nevertheless, show something of a desire for change.²⁷⁸

The establishment of the Dutch Agricultural Congress (*Het Nederlandsch Landhuishoudkundig Congres*) also contributed to the diffusion of new ideas and innovations to a growing audience. In 1846 this organisation, an initiative of one of the regional agricultural societies, began to organise big national congresses on an annual basis. Soon these congresses became a forum where all kinds of real-life problems were discussed and solutions were suggested.²⁷⁹ The same can be said about the emergence of the agricultural press in these years. Partly in the hands of the agricultural societies, it also became an important medium for highlighting the needs and wishes of farmers.



Almost from the start, attempts were being made to establish one national organisation based on the regional agricultural societies, to represent the interests of the agricultural sector to the national government. However, for a long time these efforts failed, largely

²⁷⁷ 'Verslag over den landbouw in Nederland for the year 1873', p. 102. This annual report on the state in Dutch agriculture was published for the first time in 1851. However, from 1806 until 1851 a similar report had already appeared as 'De Staat van de Landbouw'. The series were continued until 1966.

²⁷⁸ Van Zanden, 'Mest en ploeg', 1992, p. 55.

²⁷⁹ Van der Poel and Wessels, 'De verslagen van het Nederlandsch Landhuishoudkundig Congres', 1953. This book is in fact an index on the whole series.

because of regional particularism. Finally, the organisation of a big, international agricultural exhibition in Amsterdam, in 1884, formed the basis for drawing the regional societies together to organise themselves into one national, co-ordinating body. In 1893 this organisation, the *Nederlands Landbouw Comité* (Dutch Agricultural Committee), NLC for short, was officially inaugurated by the Minister, as the formal representative body for the Dutch agricultural sector. In 1918 the NLC was honoured with the prefix *Koninklijk* (Royal); by then apart from the regional agricultural societies other general organisations had also joined, e.g. the two herdbook organisations (which had been established in the 1870's).

Meanwhile, besides the NLC, and following the example of the interdenominational, German *Bauernvereine*, the *Nederlandse Boerenbond* (Dutch Farmers' Union) was established in 1896. Instead of speaking of a *landbouwmaatschappij* (a farmers' society) its founders deliberately called the organisation a *boerenbond*, a farmers' union. This confessional *Boerenbond* aimed at putting the farmer and his family at the centre of all concerns, whereas the secular NLC was, in practice, a purely technical organisation, they claimed. The farmers' union had the pretension of making the protection of the social and spiritual interests of the farmers their first and foremost objective. For instance, from the beginning the *Boerenbond* did much more in the field of the cooperative movement, helping farmers organise themselves into cooperatives, especially the ones for dairying.²⁸⁰ Although, initially, the *Boerenbond* did become part of the NLC, it left this organisation in 1899 to become a federal organisation of autonomously organised, regional farmers' unions on their own. The rivalry between the liberal spirit in the NLC and the strict confessional nature of the *Boerenbond*, stood in the way of a further amalgamation.

At first, the *Boerenbond* was a purely interdenominational organisation, but in 1920 it became an exclusively Catholic organisation and in 1924 changed its name to *Katholieke Nederlandse Boeren- en Tuindersbond*, or KNBTB, the Catholic Farmers' and Horticulturists' Union. In 1918 protestant farmers had already organised themselves into the *Nederlands Christelijke Boeren- en Tuindersbond*, the NCBTB, the Dutch Protestant Farmers' and Horticulturists' Union.²⁸¹ In line with the polarisation between ideological and confessional organisations that spread like wildfire in this period, the compartmentalisation in the agricultural sector and its protection of interests was also settled.²⁸² The KNLC, the KNBTB and the NCTB became the three 'central agricultural organisations' (or CLO's, in Dutch terminology) representing a large number of regional and local organisations. In Dutch they were called *standsorganisaties*, indicating that they were a class-based pressure group, uniting people (farmers) with the same social task and *stand* (class).

²⁸⁰ Duffhues, 'Voor een betere toekomst', 1996; Smits, 'Boeren met beleid', 1996, pp. 24-25; Dekker, 'Zuivelcoöperaties op de zandgronden', 1996.

²⁸¹ Van der Woude, 'Op goede gronden', 2001.

²⁸² At that time the whole of social and social-economic life in the Netherlands became strongly divided along religious belief lines: Protestant, Catholic, secular. The Dutch themselves speak about *verzuiling*, or pillarisation or compartmentalisation.

3.2. 'Den Haag' and the farmer: government and agricultural organisations

In line with these organisations and to take care of the interests of the wage workers in the agricultural and horticultural sector three organisations were founded to represent the interest of the labourers working in the agricultural and horticultural sector.



In addition, in the 1880's, the newly established 'green lobby' formed by the joint agricultural societies managed to convince the national government of its responsibilities towards the agricultural sector. It was persuaded to take charge of tasks in a way that governments elsewhere already did. The establishing of a State Commission in 1886 rectified the lack of an official, governmental corpus that could develop and implement such an official agricultural policy. The Commission's terms of reference were to make inquiries into the present state of Dutch agriculture and to suggest concrete ways in which the government could support and stimulate developments in the agricultural sector. Before it delivered its final report in 1890, the Commission had already made several preliminary suggestions, which the government hastened to implement.²⁸³ It should be said, however, that the proposals and recommendations the Commission put forward, did not appear completely out of the blue. They concurred with existing facts and trends, or with the most serious problems that frustrated developments in the sector at that moment and the Commissions recommendations were generally seen as correct. Therefore, after 1886 the government made great strides in its policies towards the agricultural sector to catch up on the backlog.

One of the first steps taken was the introduction, in 1889, of a law concerning the export of butter (the *Boterwet*) aiming to solve the current problems of bungling in the trade. Later it was revised and somewhat refined and this led to the introduction of a government control mark on butter (*rijksbotermerk*) in 1904. In 1913, a similar government control mark was established for full-cream cheese, followed by three control marks on several sorts of non-full-cream cheese in 1918. The establishment of these control marks should be seen in the light of more stringent notions of quality, caused by stronger international competition. By doing so the government indeed recognised and underlined the way Dutch agriculture was developing as a strongly export-orientated sector. The result indeed was that, while some four decades earlier the adjectives 'Dutch' (or in German: *Holländisch*) were the hallmark for bad products, before the First World War they had already become a mark of first-class quality. In 1920, the export of butter or cheese that had not been approved and fitted with a State control mark was forbidden.²⁸⁴

Another example of the energetic way in which the government accepted its responsibilities towards the sector were initiatives in the field of agricultural research. Following the German example, three new Agricultural Research Stations (*Rijkslandbouwproefstations*) were established in 1890 (one already existed), followed by the introduction of a Plant Protection

²⁸³ Vermeulen, 'Den Haag en de landbouw', 1966.

²⁸⁴ Knapp, 'Botercontrole in Nederland', 1927; Bos, 'Brits-Nederlandse handel en scheepvaart', 1978, p. 267.

Service (*Phytopatologische Dienst*) in 1899.²⁸⁵ And these were the first of a whole string of institutes in many different fields of agricultural research which were established in the following years. The Plant Protection Service in particular was established to guarantee the phytosanitary quality of exported planting stock, when importing countries like the USA began to make phytosanitary demands on the imported agricultural and horticultural products.²⁸⁶

In 1890 the government – again on the advice of the State Commission – adopted an older initiative of some of the private regional agricultural societies to employ agricultural advisers. The Commission had expressed the opinion that their advisory work would only bear fruit if it was well organised and if advisers (called *rijkslandbouwleraar* and later on *rijkslandbouwconsulent*) were appointed to every province. Some time later, special extension officers for the horticulture and fruit-growing sector were also employed. In some regions special dairy advisers (*zuivelconsulenten*) were also appointed, initially partly paid by the regional agricultural societies. After some time, all these functionaries had a network of chief assistants and assistants at their disposal. Between 1890 and 1924 the number of these officials grew to 111 – one for every 2,000 farmers/horticulturists. This countrywide network of experts, each with his own special field, played a crucial role in channelling through the results of the new and rapidly expanding amount of agricultural scientific knowledge.²⁸⁷ They made practising farmers and market gardeners familiar with all the novelties and new developments in their field.

Again, on the instigation of the State Commission, steps were also taken in the field of education. In 1888, the government set aside 20,000 guilders in its budget for that year to meet the need for subsidising agricultural education. In addition, on the instigation of the State Commission a separate, special inspector for agricultural education was appointed, and subsequently, in 1893, the first agricultural and horticultural winter schools were established and winter courses were organised. These were the beginnings of what was to become an extensive system of primary, secondary and higher vocational education, which has been shown to be essential, not only for the training of independent farmers and horticulturists, but also for the education of a middle and higher management.²⁸⁸

A special place in the spectrum of agricultural education was taken by the education of farmers' wives and farmers' daughters, which initially focused mainly on milk production and processing. Farm household management education enjoyed this special place not only because of its important contribution to primary agricultural production, but also in a more

²⁸⁵ Zadoks, 'A hundred years and more of plant protection', 1991, pp. 3-24; Bieleman, 'Gewasbescherming', 2000, pp. 202-225.

²⁸⁶ Oort, 'Heden en toekomst', 1966; Dekker, 'De geschiedenis', 1974; Zadoks, 'A hundred years', 1991; Bieleman, 'Gewasbescherming', 2000, pp. 205-207.

²⁸⁷ Zuurbier, 'De besturing en organisatie', 1984, pp. 33-35 and 85-96.

²⁸⁸ Van der Poel, 'Het landbouwonderwijs in Nederland tot 1918', 1976; Goudswaard, 'Agrarisch onderwijs', 1986; Van der Burg, 'Een half miljoen boerinnen', 1988.

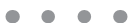
3.2. 'Den Haag' and the farmer: government and agricultural organisations

general sense because of its role in the process of modernization that took place in farming and in the countryside.²⁸⁹

Previously, in 1876, a small-scale State Agricultural School had been established in the small country town of Wageningen. After some drastic reorganisations in 1896, 1904 and finally in 1918, the institution was upgraded to university status.²⁹⁰ Thereafter, the Agricultural University (nowadays called Wageningen University) grew into an educational and research centre containing an expanding variety of agricultural disciplines in one place. Together with other new institutions in the field of agricultural research and agricultural extension, and with the system of vocational agricultural schools, the University has contributed significantly to the performance of Dutch agriculture. Only the education of veterinary surgeons, which had in fact started earlier, was located elsewhere. In 1821, a State Veterinary School was established in the town of Utrecht to try to bring an end to the quackery that existed at that time. The institute was upgraded to university level in 1918 and finally became a part of the Utrecht State University in 1925.²⁹¹

In addition to all the efforts made in the field of research, extension and education, and again at the insistence of the agricultural societies, the government also promised to gradually concentrate all its activities concerning the agricultural sector in one single ministerial department. (Up to then, several different ministries had been responsible for different agricultural matters). In 1898 a department of agriculture had been set up at the Ministry of Home Affairs, and was given a more independent position in 1905. In 1935, an autonomous Ministry of Agriculture was established for the first time. Nowadays it is called the Ministry of Agriculture, Nature and Food Quality (or LNV in Dutch).

The chain of research, extension and education under the umbrella of one governmental body, formed the basis of the rapidly expanding agricultural success when the economy recovered after about 1895. By doing so, the government had paved the road to success, though in most of the wide variety of farming systems, farmers, familiar as they were with responding to the challenges of a changing market, had themselves seized the opportunities that lay ahead of them.²⁹²



²⁸⁹ Van der Burg, 'Geen tweede boer', 2002.

²⁹⁰ Van der Haar and Faber, 'De geschiedenis van de Landbouwniversiteit Wageningen', 1993.

²⁹¹ Offringa, 'Van Gildestein naar Uithof', 1972.

²⁹² Compare: Foorthuis, 'Bouwen aan een netwerk 1890-1915', 1994; Van den Ban, 'Small farmer development, 1988.



Illustration 3.3. Series of posters to stimulate farmers to cultivate as much bread grain (koren) as they could. In the last year of World War I bread grain had become increasingly scarce due to the fact that the supply of North-American grain had stopped completely. At the government's request the artist Willy Sluiter made a series of posters to stimulate farmers to cultivate as much bread grain as they could in order to meet the Dutch domestic demand: 'Your country demands grain; soon and much'. Source: IISG, Amsterdam.

3.2. 'Den Haag' and the farmer: government and agricultural organisations

The increase in government concern about the agricultural sector went along with a rapid growth in the administrative machinery that was in charge of its development and implementation. This was especially so during the crisis of the 1930's, as to an important extent this growth was caused by the way the Dutch government tried to prevent the agricultural sector from disintegrating during the crisis. As agricultural production increased during the 1920's, price developments grew ever more unstable. Finally, after 1928, prices fell dramatically and the 'green front' was able to convince the national government to drop its liberal attitude towards economic life. A so-called *Tarwewet* (Wheat Act) came into effect in February 1931 which was primarily meant to support the arable farmers in the marine clay areas in the north and the southwest of the country to make this crop profitable again.

Although the results of this measure satisfied its expectations fairly well, many members of the farming community continued to rally against the government's attitude towards the sector. Its policy was felt to be too lax, too inconsistent, and too one-sided, aimed at the interests of the large farmers only. Horticulturists, arable farmers of the *Veenkoloniën*-region with their (industrial) potato cultivation as well as the small farmers in the sandy districts with their mixed farming system based on the production of industrial milk (i.e. butter), pork and eggs felt very much discriminated against.

Meanwhile, the situation in the livestock farming and horticulture sector had gone seriously wrong, to a great extent caused by the fact that Great Britain had decided to devalue the pound – making Dutch agricultural products expensive – while our main competitors on the British market, the Danes, followed with a devaluation of their krone. In July 1932 the government put a *Crisis-zuivelwet* (Crisis Dairy Act) and a *Crisis-varkenswet* (Crisis Pig Act) into force, to help in particular the dairy farmers and their colleagues in the mixed farming system of the sandy soils. Subsequently, what had eventually become a true forest of legal measures was pulled together into an Agriculture Crisis Act, which was introduced in 1934. This law provided the minister in charge with far-reaching powers to settle production, prices, quality, trade and processing of most agricultural products.

The complex of crisis measures that had been established to keep the agricultural sector from almost certain collapse and more in particular the restrictions on farm production that were a part of it, hit small farming on the sandy soils quite badly. In 1937 as a helping hand to the industrious group of small farmers, a special governmental service was founded, the so-called Small Farmers Service.

All these measures together involved a lot of money and took a major slice of the national budget. It is estimated that between 1933 and 1936 the State annually spent almost 200 million guilders within the framework of its agricultural crisis legislation, given a total income of the agrarian sector of as much as 400 to 500 million guilders. In those years, the total national budget amounted to about 800 million guilders.²⁹³

The series of crisis measures that were taken after 1931 signalled increasing intervention by the government in the individual farming business and a true restraint on the individual

²⁹³ These figures according to: Van Zanden, 'Modernisering en toenemende betekenis van de overheid' 1986, p. 128; Van Zanden and R.T. Griffiths, 'Economische geschiedenis', 1989, p. 73.

independence of economic operating of each farmer. Before 1930, the government had restricted itself to measurements to improve the agricultural infrastructure; it was a facilitating policy. Even since then, however, it evolved into a regulating policy that allowed authorities an increasing influence on the direction agricultural production evolved over time. As such, the crisis legislation that was introduced in the years 1931-34 marked a true watershed in the relations between the individual farmer and the government.²⁹⁴

²⁹⁴ Minderhoud, 'De Nederlandse landbouw', 1935 (reprint), pp. 190-191; Minderhoud, 'Crisis en crisiswetgeving', 1943. In fact, the measures that the government took during the First World War in terms of food security can be seen as a prelude to this. Krips-Van der Laan wrote that the Dutch governmental policy after 1950 was built on the experiences that were gained and the administrative machinery that was established before the war to carry out the crisis measures of the 1930's. And as S.L. Mansholt told her, following a Dutch initiative even the impost system that was characteristic for crisis management policy in the 1930's was adopted into the European agricultural policy after the war. Krips-Van der Laan, 'Praktijk als antwoord', 1985, p. 107.

3.3. Arable (and mixed) farming in the marine clay districts

Though the arable farming sector could not profit from the rise in prices after 1850 as much as the livestock and horticulture sectors, it also enjoyed the benefits an open European market offered. Grain prices did rise, although the level they reached between 1850 and 1880 was hardly any higher than it had been during the Napoleonic era, and they now lagged considerably behind those for livestock and horticulture products. In addition to increasing domestic demand, exports of arable products now also increased, sometimes even rather spectacularly. It stimulated important changes, turning the arable farming sector into a dynamic one as well.

In the early 20th century, the joint arable farming on marine clay districts represented a little less than one quarter of the total area of farming land in the Netherlands, in terms of the area of agricultural land.²⁹⁵ Probably the most dynamic and innovative clay-arable region was the province of Groningen; although arable farmers in the Noord-Holland and in Zeeland were hardly inferior to their Groningen colleagues as far as their progressiveness was concerned. In the field of mechanisation in particular, many novelties (such as new and more efficient ploughs and threshing machines) became widely accepted in a short period of time. New were also the agricultural contracting firms making their entry into Dutch farming after 1862 when a Friesian company – following a British example – began to travel around from farm to farm with steam-driven threshing machines.²⁹⁶ At first working only in Groningen and Friesland, these firms soon expanded their working space to Holland where they worked in the then newly reclaimed Haarlemmermeerpolder. Soon afterwards, in Zeeland travelling contracting firms and their steam-threshing machinery became active as well. On the eve of World War II in the northern marine clay district of Groningen almost half (47%) of all threshing machines (261 in total) were owned by contractors; 46% by machinery cooperatives and the rest (10%) by private farmers.²⁹⁷

Typical also of the developments in arable farming in Groningen was a process in which the proportion of arable land to grassland changed, at the cost of the latter. From the early 19th century onwards up to 1914 it shifted from 5:5 to 7:3.²⁹⁸ Yet, farming on the marine clay soils of the province of Groningen remained a mixed type of farming, typified by a symbiotic interweaving of the arable and the livestock part. Strikingly, the numbers of livestock were not reduced. On the contrary, they were expanded, as farmers profited from the rising prices of the products. In fact, the expansion of the number of cattle was facilitated as the increase of the sown area meant an extension of the area under fodder crops, especially clover. As such, the quantity of manure that could be produced increased, to the benefit of the arable. In fact, the expansion of the total area under crops at the cost of the

²⁹⁵ 'Het grondgebruik in Nederland', 1912, in particular p. 177.

²⁹⁶ Van der Poel, 'Honderd jaar landbouwmechanisatie', 1967, pp. 178-184.

²⁹⁷ 'Het dorsen in de provincie Groningen', 1937; Essenburg, 'Het loonbedrijf', 1961.

²⁹⁸ Priester, 'De economische ontwikkeling van de landbouw in Groningen', 1991.

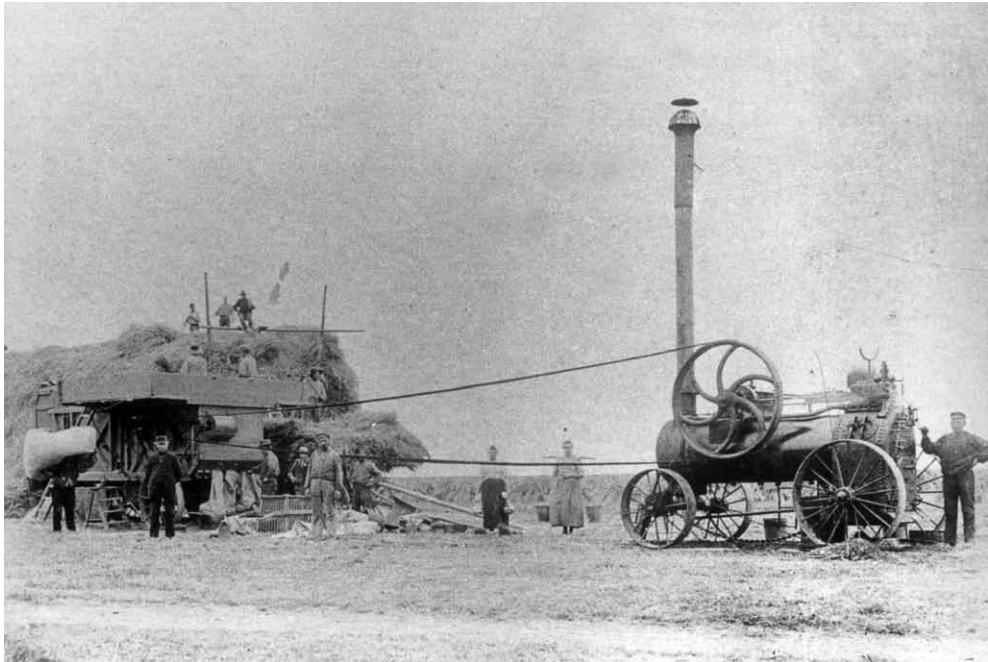


Illustration 3.4. Threshing with the help of a mobile steam engine (locomobiel) in Groningen (c. 1900). Steam-driven threshing machines spread in this province from the 1860's onwards. Source: RHC Groninger Archieven.

area under grass came down to a comprehensive and complex process of intensification of the traditional farming mixed system.

Besides the élan Groningen farmers displayed in the field of mechanisation, they were also conspicuous in their efforts to improve the quality of the farming land by the introduction of a new draining system. From 1851 onwards they energetically began to drain their arable by means of earthenware pipes. In 1883 more than 32,300 ha of arable land (27% of the total area of arable land in Groningen) were already being drained in this way, versus less than a total of 10,000 ha in the rest of the country. This new drainage system made the traditional open ridge and furrow system redundant. Yet, the apparent slow progress of farmers in the southwestern delta at this point should not be judged too easily in terms of mental retardation, as the caution these farmers observed up to this point was not misplaced. Pipe drainage technology was still far from perfect and the method could only work well if regional water management and discharge systems were also well organised and worked well; this was certainly the case in Groningen.²⁹⁹

Better drainage not only reduced yield risks, but also made arable land more accessible to new machinery like seed drilling machines, while at the same time allowing the actual sown

²⁹⁹ Van der Poel, 'De landbouw na 1890', p. 522.

3.3. Arable (and mixed) farming in the marine clay districts



Illustration 3.5. A gentleman farmer (on the extreme left) and his labourers in the Noordpolder (reclaimed in 1814) in the north of the province of Groningen, in 1905.

The picture demonstrates how many men and women were employed on a large Groningen farm then. This farm, called Arion, held more than 100 ha of farming land. Source: Photo: J.F. Blöte. RHC Groninger Archieven.

area of arable land to be extended considerably.³⁰⁰ At the end of the 19th century almost all crops on the marine clay soils of Groningen were sown in rows (Figure 3.2).

As the area of arable land was expanded and improved, the area under cash crops also increased, especially the area under oats. In 1875, almost half of the area sown with grains was sown with oats. Much of it was exported to Britain to meet an increasing demand from British brewers and the oat groat industry, as well as for horse fodder. In fact, Groningen arable farmers became specialised in oat growing. In the newly reclaimed polders, however, coleseed was the farmers' favourite crop and yields were abundant there.

In general, crop yields increased substantially (Table 3.6), but besides the several technical innovations, this was also the result of a higher input of labour. The introduction of row cultivation was particularly labour intensive at first, when the actual weeding was still done by hand. This increasing input of labour was stimulated by a changing ratio between land prices and the price of labour, since the latter remained relatively cheap from the early 1800's right up to the 1870's.³⁰¹

As arable farming in Groningen was dominated by grain cropping – and remained so – arable farmers in the marine clay region of the neighbouring province of Friesland practised – traditionally – much more varied crop rotation systems, with non-food crops

³⁰⁰ By 1890 the area of land drained by earthenware pipes in this province amounted to 34,000 ha (28% of the arable), whereas the total in the rest of the country was less than 11,000 ha at that time. See: 'Verslag over den Landbouw', on the year 1890-91, pp. 308-309 and 363; also: Addens, 'Een eeuw drainage', 1952.

³⁰¹ Priester, 'De economische ontwikkeling', 1991, pp. 202-206.

Part 3 – The period 1850-1950

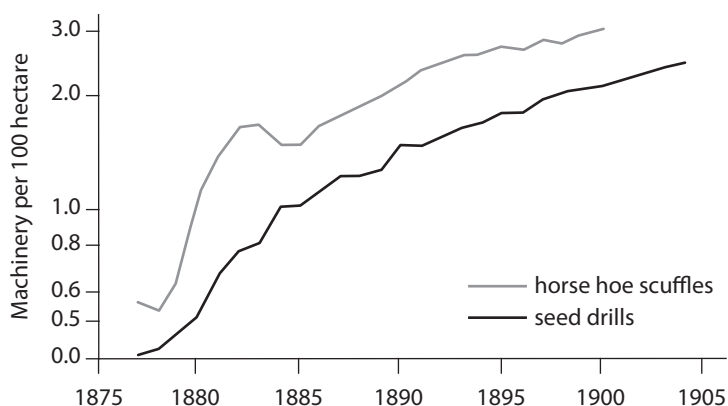


Figure 3.2. The number of seed drills and horse hoe scuffles per 100 ha of cereals, pulses and industrial crops in the province of Groningen (semi-logarithmic scale), 1877-1904.

After: Priester, 'De economische ontwikkeling', 1991, p. 268, graph 4.3.

Table 3.6. The average yield of wheat, oats and barley in the province of Groningen (mainly arable/mixed farming on marine clay soils¹) in the periods 1821-30, 1851-60 and 1901-10, in kg/ha.

	Wheat		Oats		Barley	
	kg/ha	index	kg/ha	index	kg/ha	index
1821/30	1,368	100	1,364	100	1,922	100
1851/60	1,596	117	1,760	129	2,418	126
1881/90	2,128	156	2,244	165	2,604	136
1901/10	2,584	189	2,728	200	2,976	155

Until 1929 all Dutch yields statistics were expressed in hectolitres. For sake of comparison, these statistics have been converted to metric kilograms on the basis of average hectolitre weights. We used 76 kg for wheat, 44 kg for oats and 62 kg for barley.

¹ These figures also contain a certain component of arable farming on sandy soils.

Source: Priester, 'De economische ontwikkeling', 1991, Annex 5.2.

like colseed (oil rape seed) and flax (Table 3.7). And as flax prices increased after 1850, the area under this crop was expanded. This was especially so in the years 1861-65 when the supply of Europe with flax from the USA was blocked as a result of the American Civil

3.3. Arable (and mixed) farming in the marine clay districts

Table 3.7. The crop assortment in arable/mixed farming on marine clay soils in Groningen, Friesland and Zeeland, 1875.

	Groningen		Friesland		Zeeland	
	hectares	in %	hectares	in %	hectares	in %
Winter-sown grain	25,400	34	5,800	22	31,500	33
Spring-sown grain ¹	24,000	32	3,300	12	9,400	10
Potatoes and sugar beets	2,800	4	7,500	28	9,800	10
Non-food crops	1,800	2	5,800	22	10,400	11
Pulses	9,200	12	2,600	10	15,600	16
Fodder crops	10,500	14	1,700	6	11,100	12
Fallow	1,400	2	100	0	7,200	8
Total	75,200	100	26,800	100	95,000	100

¹ Including buckwheat.

Source: 'Verslag over de landbouw' over 1875, pp. 43-46.

War. Consequently, flax cultivation had its heyday around 1870. In 1875, in the northern Friesian arable district about 17% (!) of the arable was sown with this crop.

Nevertheless, by far the most important crop of the arable farmers in the northern parts of Friesland was potatoes. Although potato cropping had suffered heavily from the phytophthora in 1845 (and again in 1861) and as the area under potatoes had been reduced quite a bit, it was expanded again from the 1860's onwards. In 1875 the crop took up 29% of the sown area. Ever more potatoes were exported to England, in particular. In this period also the foundations were laid for what would eventually become a speciality of Friesian arable farming: the cultivation of seed potatoes or *setters* as Friesian potato farmers called them.³⁰² After 1920 in particular this sector expanded enormously. Exports of seed potatoes increased from 5,000 tonnes per year in 1921-25 to almost 131,000 tonnes in the years 1936-40.³⁰³

In the south-western marine clay area (consisting of the islands of the provinces of Zeeland and Zuid-Holland, as well as the north-western parts of the province of Brabant), a sophisticated farming system had been developed after the Late Middle Ages. Besides cereals like barley and wheat and pulses, arable farmers here produced a whole range of special crops like coleseed, flax, all kinds of special seeds (canary grass, mustard and caraway) and – of course – madder.³⁰⁴ Crop rotation systems here were not only characterised by

³⁰² 'Overzicht', 1912, p. 90; Minderhoud, 'De Nederlandsche landbouw', 1935, p. 49.

³⁰³ In the post-war years exports went up to as much as 316,600 tonnes per year. Addens, 'Zaaizaad en pootgoed', 1952, pp. 233-234.

³⁰⁴ Priester, 'Geschiedenis van de Zeeuwse landbouw', 1998.

their wide variety of crops, but also by their labour-intensive character caused by the way farmers attended their arable and crops.

After 1850, farmers here also profited from increasing exports, especially those of madder to Britain. Many new madder kilns were built by groups of farmers to process their raw material. In addition to that, madder merchants founded factories where the madder roots were processed to form *garancine*, a preparation that was much more concentrated than the traditional product. As such, a new symbiosis arose between these commercial *garancine* manufacturers on the one hand and the traditional madder kilns, owned by corporations of farmers on the other. Between 1845 and 1867 a total of at least 21 *garancine* factories were established. Because of this and an ever-growing demand for madder from Britain, the cultivation of madder steadily increased to about 1870.³⁰⁵

However, even before grain coming from North America flooded the European markets causing prices to fall, arable farmers had to face the consequences of the new industrial era that was emerging. After about 1860, the demand for coleseed as the raw material for lamp oil fell. After that lamp oil was replaced by paraffin and consequently the cultivation of this crop lost its profitability and was reduced.

Much more serious, however, in particular for arable farmers in the south-western marine clay district – heavily dependent as they were on their madder cultivation – was the successful introduction of a synthetic dye, alizarin, by the German chemical industry as a substitute for madder, in 1868.³⁰⁶ In a very short time madder prices fell dramatically. Whereas in 1869, the price for madder had still been as high as 30 guilders per 50 kg, it dropped back to 17 guilders per 50 kg in 1873 and finally to only 12 guilders in 1876. In those days, the limit for profitable production was still reckoned to be about 20 guilders per 50 kg. As a consequence and in a very short time madder vanished from the fields in Zeeland (Figure 3.3). In 1872-73 3,400 ha of madder was still being harvested, whereas in 1876 there were only 960 ha left, decreasing to a mere 133 ha by 1880.³⁰⁷

In the long term, however, a new crop was to bring relief: sugar beet. In 1858, the first beet sugar factory was established in the town of Zevenbergen (in the Northwest of Brabant). From then on a growing number of sugar manufacturers did their best to persuade farmers to integrate sugar beet into their cropping plan, though without much success at first. Though the consumption of sugar per capita increased considerably, the cultivation of sugar beet did not make much progress at first. Farmers and landowners were both suspicious of this new crop and manufacturers had to try all kinds of ways to persuade them to grow the crop. They handed out sowing-seed and fertilisers and as credit facilities were still very poorly developed they also 'helped' farmers that way. The reporter to the State Agricultural Commission in 1886 wrote: 'The agents of the sugar factories walk around with bank notes and contracts in their pockets, and seeing these banknotes many farmers are tempted to

³⁰⁵ Schot, 'De meekrapnijverheid', 1986; Schot, 'Het meekrapbedrijf in Nederland', 1987; Priester, 'Geschiedenis van de Zeeuwse landbouw', 1998, pp. 323-374.

³⁰⁶ Wiskerke, 'De geschiedenis van het meekrapbedrijf', 1952, pp. 124-130.

³⁰⁷ Bieleman, 'Geschiedenis van de landbouw', 1992, pp. 263-264.

3.3. Arable (and mixed) farming in the marine clay districts

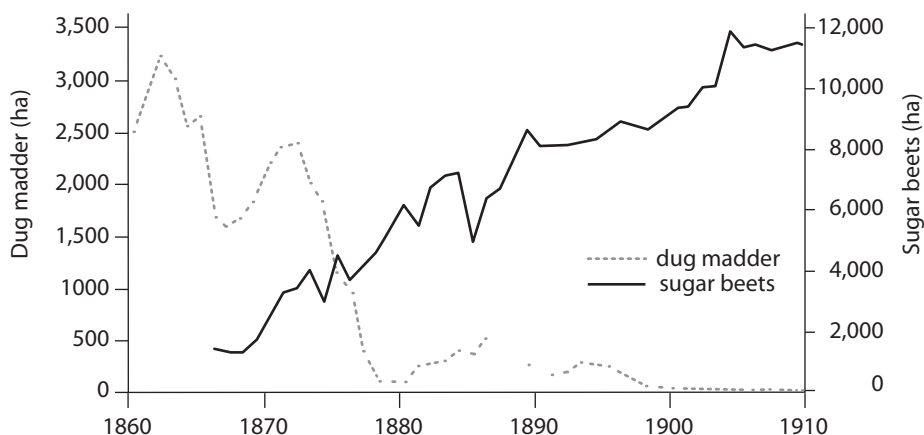


Figure 3.3. The area under madder and sugar beets in the province of Zeeland in hectares, 1851-1940. Dug madder (left axis). Sugar beets (right axis). After: 'Verslagen van de landbouw'.

grow a larger part of their lands with this crop than in fact was economically thought-out from a farm-management point of view'.³⁰⁸

However, as in the 1880's the price of grains dropped further, the area under sugar beet expanded. In the years 1866-70, only 6,600 ha country-wide had been under sugar beet, but by 1881-90 the area had increased to about 20,300 ha and then, in the pre-war peak 1921-25, up to 67,400 ha. In these years the net exports of beet sugar amounted to as much as one quarter of the total domestic production.³⁰⁹ Meanwhile productivity had increased from 27 tonnes per ha in 1871-80 to 38 tonnes per ha in 1931-40.³¹⁰

During the depression of the 1880's and 1890's, the cultivation of sugar beet had thus been partly counterbalancing the loss in profitability of other crops. But as the crisis continued, relations between farmers and the private sugar manufacturers worsened, and farmers began their own factories on a cooperative basis. The first of these cooperative factories was founded in 1899, and soon, as the economic climate recovered, others followed. On the eve of the Second World War there were six cooperative and seven private beet sugar factories in the Netherlands; the first producing 61% of the total Dutch production of beet sugar.³¹¹

Initially beet sugar cultivation was limited largely to the south-western delta region; in the northern marine clay districts of Groningen and Friesland it did not develop to the same extent at first. Only after the Friesian Agricultural Society had propagandised sugar beet cultivation, did the crop slowly become accepted by farmers there as part of their

³⁰⁸ 'Uitkomsten van het onderzoek', 1890, LXXX, p. 6.

³⁰⁹ Terlouw, 'De geschiedenis van de bietsuikerindustrie', 1969, pp. 199-201 and annex C and D; Bakker, 'Suiker', 1992.

³¹⁰ 'Verslag van de landbouw', concerning years.

³¹¹ Minderhoud, 'De landbouwindustrie', 1943, pp. 417-420.

rotation systems, in the 1890's.³¹² It was not until 1896 that the first beet sugar factory was established in the north, in which farmers and private entrepreneurs participated. And as the economy improved, the *Friesch-Groningsche Coöperatieve Beetwortelsuikerfabriek* was established, in 1914, which was one of the largest and most advanced factories in Europe at the time.³¹³ In 1930 there were a total of 14 beet sugar factories in the Netherlands, 6 of them were run on a cooperative basis.³¹⁴

The success of sugar beet lay to a great extent in the fact that it could take the place former industrial crops had in the current crop rotation systems, and this was especially so after artificial fertilisers became available. It is also noticeable that the first cooperative buying society in the Netherlands was established in Zeeland, in the village of Aardenburg (near the Flemish border), in 1877. Its name, *Welbegrepen Eigenbelang* (Well-understood self-interest) indicates, indeed, that the participating farmers had a very business-like attitude towards this kind of cooperating.³¹⁵

As sugar beet cultivation in the southwest more or less compensated the farmers for the falling grain prices during the crisis of the 1880's and the 1890's, Groningen arable farmers, in particular, stuck mainly to their grain cropping. However, it was the strawboard³¹⁶ industry that gave these northern farmers the opportunity to sell their straw at a profit, when the price of grain fell. It helped them to cope with the economic problems they had to face. As early as the late 1860's, some Groningen farmers had already been selling their straw to strawboard factories in Ostfriesland (Germany). Shortly afterwards, in 1869, the first of such a factory was established in Groningen, and it was soon followed by others. In 1899, farmers in the Oldambt district in that province decided to start their own factories on a cooperative basis. On the eve of the Second World War there were nine cooperative strawboard factories in the Netherlands and nine private ones; except for one, they all were situated in the province of Groningen. Being an export industry pre-eminently, in the 1920's about 85% of its production was sold abroad, almost entirely to Britain.³¹⁷



Farming in the extensive (and partly 19th century reclaimed) marine clay polders in the province of Holland, was characterised by mutual striking differences in character, while it was strongly influenced by the nature of farming in the adjoining regions. Farming in the Waard- and Groetpolder and the Anna Paulownapolder in Noord-Holland (reclaimed respectively in the 1844 and 1847), for instance, was strongly influenced by what happened in the adjacent horticulture district of the Langedijk; root crops were of hardly any importance here. In the western parts of the Haarlemmermeerpolder (southwest of Amsterdam and reclaimed in 1852) bulb growing became important, as did the cultivation of sugar beets in

³¹² De Vries, 'Landbouw en bevolking', 1971, p. 51.

³¹³ Minderhoud, 'Landbouw-coöperatie in Nederland', 1949, pp. 127-128.

³¹⁴ 'Verslag over de landbouw', 1930, p. 170

³¹⁵ Van Stuijvenberg, 'Het Centraal Bureau', 1949, pp. 96-132.

³¹⁶ Strawboard is a coarse yellow cardboard made of straw pulp.

³¹⁷ Minderhoud, 'Landbouw-coöperatie in Nederland', 1949, pp. 115-124.

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the rest of this polder. In the large Zuidplaspolder (north of Rotterdam in Zuid-Holland and reclaimed in 1840), wheat cultivation came to the fore as well as the cultivation of fodder crops for the livestock farmers in the adjoining dairy farming areas.

From the results of the agricultural census held in 1921, it appears that in the arable farming district in the marine clay districts the average farms held 19.4 ha. The biggest farms were found in two farming districts in the north of the province of Groningen, where an average farmer respectively had 42 and 31 ha of land. In the first of these two districts, the Nieuw-Oldambt district, 75% of the farmers had 20 ha or more land and 34% had even more than 50 ha; holdings with 100 ha or more land, however, were no exception. Most farmers in the clay arable districts in Groningen had at least six horses (compare Table 3.8). In the Friesian clay arable district the average size of a holding was 16 ha, the same as in the province of Zeeland. In the marine clay districts of Northwest Brabant an average farm had about 18 ha in 1921.³¹⁸

Shortly after the end of the First World War, more specifically in the years 1921-22, there was a turn in the upward trend in agricultural prices as prices fell. The background to this changing trend was a worldwide overproduction of agricultural produce, as a result of improving technologies and increasing productivity. Agricultural wages also decreased, but – of course as usual – at a much slower pace. Consequently, arable farming had to face a malaise that gradually deepened. Especially in 1928, prices fell to a disastrous level. The price of wheat, for instance, went down from about 13.50 guilders per 100 kg in 1925-27,

Table 3.8. The number of farmers according to their number of horses in some clay arable districts in the provinces of Friesland, Groningen and Zeeland, in 1910.

	1-2 horses		3-5 horses		6-10 horses		≥11horses		Total
	number of farmers	in %	number of farmers	in %	number of farmers	in %	number of farmers	in %	number of farmers
Friesland ¹	1,198	57	601	29	271	13	12	1	2,082
Groningen ²	946	33	765	27	944	33	183	7	2,838
Zeeland ³	2,850	52	1,489	27	981	18	127	3	5,447
The Netherlands	101,560	85	11,943	10	4,639	4	784	1	118,926

Name of the agricultural districts involved: ¹ Kleibouwstreek; ² Noordelijke Bouwstreek, Noordelijk Westerkwartier, Centrale Bouwstreek, Klein Oldambt, Nieuw Oldambt; ³ The whole province.

Source: Databank Rural History group, Wageningen University.

³¹⁸ 'Het grondgebruik in Nederland in 1921', 1923.

to 10.98 guilders per 100 kg in 1929 and finally to 6.32 guilders in 1931, being just 47% of the first amount mentioned above.³¹⁹

To save the arable farming sector from imminent collapse and to prevent a massive discharge of agricultural labourers, the national government decided to help the sector with a support scheme to try to make one of its most labour-intensive crops – wheat – pay again, the *Tarwewet* (Wheat Act). It was meant to guarantee farmers a minimum price of 12.50 guilders per 100 kg, which was, in fact, twice as high as the current price on the world market. Arable farmers reacted rapidly by increasing their area under wheat enormously. While the area of winter-sown wheat had been about 38,600 ha in the years 1921-30, it was expanded to 75,400 ha in 1933, finally leading to an area of 84,700 ha in 1935. To prevent an even bigger increase, it was then decreed that no farmer was allowed to sow more than one third of his land with wheat.

As part of this governmental support farmers had to sell their wheat compulsorily to a central buying office set up by the government, the Wheat Central. This organisation paid them strictly according to the quality they delivered, which – in turn – brought about a demand for better quality seeds. New cultivars were introduced replacing the traditional landraces, resulting in a striking increase in productivity.³²⁰ Before the war, in the years 1901-10, the average yield of winter sown wheat had risen to as much as 2,175 kg per ha, which had increased to 2,925 kg in the years 1921-30, and afterwards to a 3,150 kg/ha in 1936-40.³²¹ These figures meant that in fact total Dutch domestic production of wheat had multiplied in the first three decades of the century by a factor of 2½ to 3.

Nevertheless, the financial year 1931-32 turned out to be the worst of the Interbellum years for the arable farming sector. Still – and partly because of the interventionist policy of the government – results in this sector were not as bad as they were in some of the other sectors of Dutch agriculture.

As the situation in arable farming districts worsened, many land labourers were discharged (at that time, this group in total contained more than 60% of all workers in the agricultural sector). In 1934-35 an average of 20% of farm labourers in the clay arable districts were discharged, but in the province of Friesland, this share went up to 44%.³²²



As in other sectors, the situation in clay arable farming was also completely disrupted during the years of the German occupation. Government food supply regulations prohibited the cultivation of crops that were not directly essential to feed the population and at the same time it tried to stimulate farmers to grow bread grains and potatoes. As a result, the area under wheat, for instance, was extended from 42,000 ha in 1939 to 104,900 ha in 1944. Considering the home supply of vegetable fats the cultivation of colseed was made

³¹⁹ Minderhoud, 'Crisis en crisiswetgeving', 1943, pp. 504-508.

³²⁰ Bieleman, 'Tarweteelt en tarweveredeling', 2000, pp. 180-210.

³²¹ 'Verslag van de landbouw'.

³²² Van den Noort, 'Omvang en verdeling', 1965, pp. 22-23.

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compulsory in 1943. From what had become a marginal crop its area was spectacularly extended from only 1,800 ha in 1940 to as much as 49,500 ha in 1944, in spite of the inundations.³²³

Yet, it has been demonstrated that productivity did fall much less than official, contemporary governmental statistics claimed. It is estimated that in spite of all the problems farmers had to cope with, wheat yields (spring sown and winter sown together), for instance, were still as high as 2,940 kg/ha – or 96% of pre-war results – in 1943.³²⁴ Disastrous, however, were the inundations, especially when the young polders were flooded with salt water. Yet, it was remarkable that many of the inundated areas were again able to produce a more or less successful harvest in the summer of 1945.

³²³ These figures are derived from: CBS, 'Economische en sociale kroniek', 1947, p. 93 Table 5. Presumably the figures for 1944 must have been even higher.

³²⁴ Trienekens, 'Tussen ons volk', 1985, pp. 250-251, Table xii and pp. 256-257 Table xiii.

3.4. Mixed farming in the riverclay district and in the loess district of Zuid-Limburg

Around the mid-19th century, mixed farming in the loess district in the southern-most parts of Limburg as well as in the river clay area of the Rijn (and its branches) and Maas developed less quickly than arable farming in the marine clay regions, especially in Zeeland. Yet, it would be wrong to describe both farming systems in a comparison with the latter as backward. Arable farming on the river clay district in particular with its broad-based and mixed character was, above all, different. As such, it was optimally adapted to the special physical conditions farmers had to cope with. In terms of their area of farming land, the joint agricultural districts forming the river clay group represented about 11% of the total agricultural area in the Netherlands, in 1910.³²⁵

From the mid-19th century onwards, mixed farming was very dynamic too, as is apparent from the energetic way in which a start was made to improve the drainage of the area with the help of steam-driven pumping stations. From 1846 onwards, water management in a growing number of polders was regulated by means of this new technology. By doing so, the area was clearly ahead of other polder regions in the country, though admittedly nowhere else were the water management problems as serious as they were here. Yet, it would not be until the 1950's that many of these problems (and those related to them) were solved completely and satisfactorily. Until then, the vast back swamp areas were still flooded every winter anew and therefore had no other agriculture use than as extensive meadow land.

And in spite of the energetic introduction of steam-driven pumping stations, it was the old seepage (*kwel*) problem and the inconceivable big and almost hopeless problem of weed pollution that it generated which governed arable farming here. Around 1850 arable land in the Betuwe district was described as: 'a flowering garden full of poppies, cornflowers, camomile, charlock, etc'.³²⁶ And that was something farmers elsewhere in the Netherlands were not used to.

This situation caused farmers to remain bound to labour extensive working methods. For instance, typically, row cropping was only gradually adopted. Even in the 1880's, this technique was rarely utilised here, as seepage made the arable too wet for tillage in autumn and spring.³²⁷ As a result yields of most crops were lower than farmers elsewhere were used to. However, they were obtained with substantially fewer costs and less labour, which could be used on other activities around the farm.

As far as they were dependent on wheat cultivation, farmers on the river clay area – as well as those on the loess of Zuid-Limburg – were able to benefit from a growing domestic sales potential. Already before North-American grain flooded the European markets, the domestic consumption per capita of this more 'luxury' sort of flour (as it was used for bread)

³²⁵ 'Het grondgebruik in Nederland', 1912, especially p. 177.

³²⁶ Van Brakell van den Eng, 'Losse gedachten', 1850, p. 13.

³²⁷ 'Schetsen', 1912, p. 321.

had doubled!³²⁸ And though farmers indeed benefited from the rising prices of livestock and fruit, they remained predominantly focused on grain cropping for the time being. In only one part of the district, the IJssel-district between the towns of Zutphen and Zwolle, did the price rise of livestock products compared to arable products lead to a more pronounced focus on livestock farming after 1850. It was consistent with what happened in the adjacent sandy districts (as we will see hereafter) and what occurred even more frequently after 1880, when grain prices fell and remained relatively low. 'Almost everything that comes from the arable and the pasture land is being fed to the animals, nowadays', was reported to the State Agricultural Commission of 1886.³²⁹ However, more than elsewhere on the arable in the river clay district rye was an important grain crop.

Farmers on the loess soils of the hilly lands of Zuid-Limburg also benefited from the advantageous economic climate, after 1850. But, perhaps even more so than in the river clay area, they stuck to grain cropping predominantly. However, this rather one-sided cropping system of winter-sown grain (wheat and rye), combined with a lack of adequate manuring, made this farming system one of the least productive in the country. In 1870 wheat here would produce about 17 hl/ha (1,275 kg/ha), still less than in parts of the Betuwe district, where it produced an average 19 hl/ha (1,425 kg/ha). As a comparison, in Friesland average wheat yields would be as high as 26 hl/ha (1,950 kg/ha) and in Zeeland 24 hl/ha (1,800 kg/ha).³³⁰ Nevertheless, farmers tried to raise productivity by using new cultivars of this crop.

Ever since the 1860's, beet sugar manufacturers had tried to persuade farmers in the river clay area, as well as in Zuid-Limburg, to take up sugar beets in their cropping systems. Like the entrepreneurs in the south-western marine clay area, they tried to induce farmers to do so by handing out sowing seed and cash advances. However, as long as grain prices remained relatively favourable, the latter showed little or no interest. Nevertheless, in the Betuwe district in 1875 already 7% of the arable was sown with sugar beet. Yet, in the Limburg loess district livestock farming attracted more attention from farmers in the 1880's, although the reporter to the State Agricultural Commission saw the increasing importance of pig fattening as a symptom of degradation.³³¹

Because of the one-sided and intense focus of the current farming practice on grain cropping in the loess district as well as in the river clay area, farmers in both regions heavily suffered from the depression in the 1880's and 1890's. Moreover, wages had gone up due to the expanding brick industry in both areas and – especially in Zuid-Limburg – the industrial developments in the adjacent German regions. Due to factors such as these profits barely increased, not even when the economy improved overall after 1900. And while profitability did increase rapidly then particularly in the sandy districts, this was not the case in these two agricultural districts. In fact, it seems that farmers in the river clay area as on the Limburg loess had to let go the wave of intensification that drastically changed farming everywhere

³²⁸ De Jonge, 'De industrialisatie van Nederland', 1968, pp. 217ff (Table 16).

³²⁹ 'Uitkomsten van het onderzoek', 1890, VII, p. 21-22; 'Schetsen', 1912, pp. 272-273.

³³⁰ 'Verslag van de landbouw' 1870, pp. 36-37.

³³¹ 'Uitkomsten van het onderzoek', 1890, XCII, pp. 10-11; XCIV, p. 10; XCV, pp. 6 and 17.

3.4. Mixed farming in the riverclay district and in the loess district of Zuid-Limburg



Illustration 3.6. Grain harvest in Zuid-Limburg (c. 1950).

Farming the hilly countryside of Zuid-Limburg was in many ways different from farming elsewhere in the Netherlands. This photo was taken in about 1950 in the vicinity of the village of Welten (near Heerlen). Source: Photographer: Van Agtmaal. Nederlands Openluchtmuseum, Arnhem.

else in Dutch agriculture (especially in the sandy regions) at that time. Furthermore, in the river clay area, but also in Zuid-Limburg, an already ongoing process of extensification developed even further. Typical of this trend was a shift in the ratio between arable and grassland at the cost of the former. At the same time, the area of wheat was reduced in favour of crops like oats and rye. In 1875 there had been 13,600 ha of wheat in Gelderland (mainly found in the river clay district), while in 1921-25 there was only 4,400 ha remaining. In Limburg, in the same period, the area of wheat was reduced from 14,200 to 5,900 ha, or to only 41%.³³²

In the course of the 18th century the centre of gravity of domestic tobacco cultivation had shifted from the sandy soils to the eastern parts of the river clay district. Here, between the group of large farmers on the one hand and land labourers on the other, there arose a new social group of *tabakkers*, small farmers and specialists in tobacco cropping. But as competition from foreign, better tobacco qualities grew stronger, the area under tobacco was reduced and in some places former tobacco gardens were now used for horticulture.

³³² 'Verslag van de landbouw'.

In 1879, the area under tobacco had amounted to more than 800 ha and in 1889 it was already reduced to 750 ha; thereafter it fell to 210 ha in 1914 and as low as 30 ha in 1929. In the course of this process, many of the *tabakkers* had to abandon their mortgaged farms and were reduced to the social status of a (landless) labourer.³³³

In general, in the river clay area (as in Zuid-Limburg), the trend of pushing back the costs of labour led to the expanding of the area under labour-extensive forms of fruit growing. In fact, many farmers here became specialists in fruit growing and ever more of their products were exported. They began 'to pluck for the Englishman', as it was said, and following the years of the depression these farmers/fruit growers began to rely economically more and more on their orchards. They were greatly stimulated in this process by the relative price development of fruit compared to that of the products from the arable. As an indication, between 1865 and 1900 the price of apples doubled, while in the same period of time the price of rye fell to two thirds of its former level.³³⁴ Consequently, the area of pastures planted with fruit trees (mainly apples, pears and cherries) increased rapidly. In the river clay district in the province of Gelderland the area under commercial fruits increased from 4,510 ha in 1896 to 6,146 ha in 1915, i.e. by one third. In a sub-district there, the Over-Betuwe, the area under orchards was even enlarged by two thirds in the same period, covering about 11% of the total area of farming land. In some villages this could even go up to 18%.³³⁵ In particular, many of the old tobacco gardens were now planted with fruit trees. 'Nowadays it is hardly impossible for a farmer to survive without growing fruit', (*Zonder fruit kan eene boederij in deze streken nauwelijks bestaan*), read a report from the Betuwe in 1910.

Apart from this, fruit growing in the river clay district as well as in Zuid-Limburg had a considerably less labour-intensive character than in parts of the province of Zeeland, which also developed as an important fruit growing district in this period. Yet, in both the first mentioned districts fruit growing retained – for the time being – a stronger complementary character. Farmers/fruit growers still devoted little attention to this part of their enterprise. One reason for this was the fact that – especially in the river clay area – they did not usually pluck the fruit themselves, but sold it in the early summer publicly 'at the tree' to pluckers. Buyers/pluckers bore the further crop risk and had to sell the fruit.

Still, in spite of these dynamic developments in fruit culture, it became increasingly clear that farming in the river clay district as well as in Zuid-Limburg had lost its connection with what happened in terms of intensification and expansion elsewhere in Dutch agriculture after 1890. The effect was that farmers in these districts dropped behind considerably in their income, in particular in comparison with their colleagues in the marine clay districts. Already in the early 1920's, as their revenues from the hay trade and horse breeding fell, they were confronted with the gravity of the fast approaching crisis. Even in the relatively favourable years before 1930 farmers were not able to materialise a financial surplus from their income, especially those in the river clay area.

³³³ Roessingh, 'Inlandse tabak', 1976, pp. 384-385.

³³⁴ Van Zanden, 'De economische ontwikkeling', 1985, p. 309 (Table 10.21).

³³⁵ 'De fruitteelt in de provincie Gelderland', 1918, pp. 22-23.

3.4. Mixed farming in the riverclay district and in the loess district of Zuid-Limburg

Yet, in this area small farmers in particular had been successful as they turned to dairying in the post-war years. In the western parts of the river clay area in particular the number of dairy cattle had increased between 1910 and 1930. Many of these small farmers here were able to buy high quality stock from Friesland, supported by the activities of the local breeding societies and dairy cooperatives.

For the remainder, fruit growing happened to be the only sector that managed to get through the years of crisis without help from the government. Farmers were free to expand their area with fruit trees and they did so.³³⁶ Based on figures concerning the province of Gelderland it appears that the area under 'commercial fruits' doubled in these years. In 1928 this province counted as much as 9,200 ha; on the eve of the Second World War, this number had increased to 13,200 ha and in 1949 to 20,343 ha (Map 3.2).³³⁷ In some places one third of the cultivated area was under fruit. Larger farmers played an especially important role in this process of expanding of fruit cultivation. In the most western part of the river clay district, the Bommelerwaard, the cultivation of strawberries was expanded in this period. This culture, however, was practised by small farmers in particular and was of great importance for the mass of them in that region.³³⁸

And although the increase in the area under fruit in Zuid-Limburg was less spectacular than in the river clay district, fruit growing was also expanded here during these years. In Zuid-Limburg in particular apples and pears came to the front, whereas in the river clay districts plums and (even more so) cherries played an important role in the assortment (Table 3.9).

That is not the end of the story about the developments in fruit cultivation in this period. In this sector in particular many innovations became widely accepted and much was done to improve efficiency. For instance, crop protection took on a completely new character after the first motorised spraying machines were introduced in 1921, and already before the Second Word War the use of these machines was widespread. Whereas fruit growing had for a long time been chiefly complementary in character, a more specialised type of fruit growing now took shape, focused in particular on the growing of apples and pears especially. Fruit growers became true specialists as a result of better training and coaching by State extension officers. For a long time orchard pasturing was a common practice. From 1935 onwards, however, as the standard trees in these orchards were replaced more and more by bush trees, pasturing was pushed aside. In fruit growing areas in the province of Zeeland this new cultivation method (which speeds up the fruit bearing process) had already been introduced much earlier, that is to say from 1910 onwards, not only with apple trees, but also with plum and cherry trees.³³⁹ The different level in intensity of fruit growing in the distinguished fruit growing district can be seen from the relative number of orchards that were underplanted with currants or bush-shaped pome trees. In 1912 in Limburg this was

³³⁶ Lijsten, 'De Nederlandse fruitteelt 1888-1948', 1948, p. 204.

³³⁷ Van Veen, 'De Gelderse tuinbouw in ontwikkeling', 1963, pp. 9-12.

³³⁸ Van Vuuren, 'Rapport betreffende de uitkomsten', 1941, p. 33.

³³⁹ Bos, 'De ontwikkeling van de fruitteelt in Midden-Nederland', 1948, p. 43.



Map 3.2. The spread of open ground fruit farming on the eve of World War II (1938). Each dot corresponds to 100 ha. After: 'Tuinbouwgid', 1945, pp. 4-5.

only as much as 0.8% of the orchard area, in the province of Utrecht 3%, in Gelderland 5%, but in Zeeland as much as 33%!³⁴⁰

New cultivation methods like these resulted in a considerable increase in fruit yields. Shortly after the war fruit harvests were twice as big as they were in the 1930's.³⁴¹ Meanwhile fruit auctions played an important role in improving the quality of the products as far as packaging and dispatching was concerned. The first fruit auction to function satisfactorily

³⁴⁰ 'De fruitteelt in de provincie Gelderland', 1918, p. 8; Sangers, 'De ontwikkeling van de Nederlandse tuinbouw', 1952, p. 229.

³⁴¹ Bos, 'Waarom rooien?', 1953, p. 27.

3.4. Mixed farming in the riverclay district and in the loess district of Zuid-Limburg

Table 3.9. The area of top fruit in the most important fruit growing provinces in hectares, in 1939.

	Apples		Pears		Plums		Cherries		Total	
	area	in %	area	in %	area	in %	area	in %	area	in %
Gelderland	8,099	51	3,224	21	2,010	13	2,398	15	15,731	100
Limburg	8,733	69	2,355	19	755	6	820	6	12,663	100
Noord-Brabant	2,876	65	1,014	23	268	6	254	6	4,412	100
Utrecht	3,078	62	1,228	25	164	3	497	10	4,967	100
Zeeland	2,259	55	1,242	30	459	11	173	4	4,133	100
The Netherlands	28,531	59	11,579	24	4,138	8	4,224	9	48,472	100

Source: CBS, 'Statistiek van land- en tuinbouw', 1950, pp. 46-47.



Illustration 3.7. Motor spraying in the 1920's.

In the 1920's the first motor sprayers appeared in the fruit growing business in the river clay district. At first they were pulled by horses (as here on the photo), later on they were installed on the car chassis. The spray used was tar wash (vruchtbomencarbolineum or VBC). This pesticide was probably introduced in 1907 and from 1917 onwards fruit growers began to experiment with it on a larger scale. Source: Private collection author.

in the Betuwe area had been established as early as 1903; in Limburg, however, the fruit auction system only got off the ground at a much later stage.³⁴²

Yet, another important factor in the development of fruit growing was the rise of the fruit processing and canning industry.³⁴³ Already in the 18th century small syrup cookeries were active in both regions, boiling down fruit into syrup, giving added value to apples and pears, making rather vulnerable products, as it were, better transportable and guaranteeing fruit growers some sort of minimum price. By the end of the 19th century, the application of newly developed preservation techniques stimulated a hesitant start to a small-scale canning industry and provided new prospects for this trade. A completely new product in the field was jam, which was produced here from 1888 onwards.³⁴⁴ Some indication as to the extent to which the market for canned fruit (and vegetables) grew after the end of the 19th century, is given by the sales figures from the most important manufacturer of cans by far, the *NV Blikemballagefabriek Thomassen en Drijver*, which increased from almost 0.2 million in 1920 to 109.5 million in 1939 and then again another 277 million in 1950.³⁴⁵

Just before the Second World War the canning industry was able to absorb about one fifth of the total fruit harvest, though this share fluctuated from year to year and for some special fruit it could be much larger. In 1939, for example, 23% of the apples that were brought to the auctions were bought and processed by the canning industry; and of the cherries this amount even reached 33%.³⁴⁶ Thanks to new methods of preserving and newly developed products derived from fruits, potential markets could be expanded considerably and distant markets could be targeted more easily.

³⁴² Ter Hofstede, 'De ontwikkeling van de fruitveilingen', 1948.

³⁴³ Van Otterloo, 'Eten en eetlust in Nederland', 1990, pp. 82-86. Van Otterloo (ed.), 'Voeding', 2000, pp. 253-374.

³⁴⁴ Van Otterloo, 'Nieuwe producten', 2000, pp. 252-253.

³⁴⁵ De Knecht-van Eekelen and Van Otterloo, 'De groentenconserverenindustrie', 1972, p. 52 (Table 2).

³⁴⁶ 'Tuinbouwgid 1950', 1950, p. 137.

3.5. Livestock farming

Livestock farming was one of the sectors in Dutch agriculture that benefited most from the opportunities foreign markets offered after 1850. Before, in the four decades preceding the mid-19th century, during a period that has become known as the Post-Napoleonic depression, prices of livestock products had already kept up better than prices of arable products. And after 1850 the former rose considerably faster than the price of cereals. On the butter market of Leeuwarden (Friesland), for instance, the price of butter had risen by 60% between 1841-50 and 1871-80, while the price of wheat only increased by 16%. Prices of cattle rose even higher and those of sheep doubled. The new prospects for livestock farming induced an important growth in the number of cattle; between 1840 and 1880 their numbers increased by one third.

As exports increased, the assortment of the stream of exported products changed as well. The Dutch had always been renowned as exporters of dairy products. Since the 1840's, however, the exports of sheep and (breeding) cattle³⁴⁷ took an equivalent place in the total of commodities that were exported.³⁴⁸ The expanding export market in turn induced all kinds of changes and improvements in the livestock farming sector. One of the things that contributed significantly to changing production and stimulating productivity in cattle farming was the increase in the use of feedstuffs bought from outside the farms; most of them were imported. The consumption of concentrates, for instance, increased from c. 31 kg per cow to 62 kg between 1850 and 1880, and, subsequently, to another 177 kg per cow in 1910.³⁴⁹ The reporter to the State Commission for the livestock district in the province of Utrecht of 1906 wrote: 'Once, there were times that the feeding of a 1,000 oilcakes to 30 cows during wintertime was considered as a lot. These times are over now. On a similar farm, nowadays, without any hesitance 7,000-8,000 cakes are fed and to that increasing quantities of maize, linseed meal, and barley meal.'³⁵⁰ The increase in the use of purchased feedstuffs should, of course, be seen against the background of the comparative price development of these products in relation to that of dairy products, making them relatively cheaper. Yet, it represents one of the most fundamental changes in Dutch agriculture in this period.

In the early 1870's, experts raised the idea of the desirability of establishing a Dutch herdbook organisation in order to serve the ever-growing demand for high-grade breeding cattle from abroad more efficiently. It was argued that a Dutch herdbook would strengthen the position of Dutch cattle breeders on the international market and, at the same time, act as an incentive for the livestock-farming sector to improve its focus on the international market. Consequently, in 1874 the Dutch Cattle Herdbook (the NRS or *Het Nederlandsch*

³⁴⁷ Among the breeding cattle that were exported to the USA were the animals which descendants would develop into the world's most widely spread milking breed: the Holstein-Friesian. Bieleman, 'De georganiseerde rundveeverbetering', 2000, pp. 146-147.

³⁴⁸ Reens, 'De vleeschexport', 1922, pp. 57-86; Van Zanden, 'De economische ontwikkeling', 1985, pp. 221-222.

³⁴⁹ Van Zanden, 'De economische ontwikkeling', p. 226 (Table 9.9).

³⁵⁰ 'Schetsen', 1912, p. 528.

Rundvee-Stamboek) was established on the basis of examples from abroad.³⁵¹ The aim of the organisation was to form and maintain pedigree registers of approved cattle. However, the variety in types of Dutch cattle that was recorded was still very wide and for this reason Friesian cattle breeders decided to form their own separate herdbook, the *Friesch Rundvee-Stamboek* (the FRS), in 1879. The founders took the view that a separate Friesian herdbook was the most effective way of improving Friesian cattle, which they considered to be a breed on its own. As well as these two organisations, in some regions other separate, smaller herdbook societies operated for a shorter or longer time.³⁵² Initially, these herdbooks served mainly as a sort of address book for foreign buyers – Americans in particular. Some experts later believed that in some way these herdbooks had even favoured more or less a sort of negative selection, as farmers were often inclined to sell their best animals.

By the end of the 19th century it had become clear that the changing situation in cattle breeding called for better, more efficient breeding strategies and therefore for new, well-defined breeding goals. To meet these demands the Dutch Herdbook Society decided to reorganise itself, a reorganisation that became effective in 1906. By doing so, new breeding goals were to be based on easily recognisable characteristics: the black-and-white Fries-Hollands (FH) breed, the red-and-white Rijn-Maas and IJssel (MRIJ) breed and the white-faced Groningen (G) breed. Since then these three breeds – all three being a dual purpose type of cattle for producing milk as well as meat – formed the ‘big national’ three, well into the late 1970’s. At the same time, the national government began to stimulate a more rational approach to cattle breeding, appointing a number of *Rijksveeteeltconsulenten* (State cattle breeding advisors) as a part of its new and active agricultural policy.

Another important development was the improvement of water management in the low lying polders of the Holocene part of the country, resulting from the introduction and spread of steam-driven pumping stations to replace the traditional windmill. In the 1850’s the river basin area in the province of Gelderland took the lead; after 1860 both the provinces of Holland and Utrecht followed, causing a true boom in the 1880’s. The reporter to the State Commission of 1906 wrote: ‘As land use has become more intensive and there is an increased application of concentrates, farmers are able to keep more cattle than before, while cattle in areas where the lowering of the ground water level has led to a distinct improvement in the soil have become heavier. I [the reporter] have been told that in former days the dressed weight of cattle could be assumed at about 550 pounds (c. 275 kg), while nowadays it can be reckoned to be at about 650 pounds (c. 325 kg).’³⁵³ Similar comments could be heard from other dairy farming districts.

³⁵¹ Bieleman, ‘De georganiseerde rundveeverbetering’, 2000, pp. 131-153.

³⁵² Dekker and Stapel, ‘100 jaar Koninklijke Vereniging Het Nederlandse Rundvee-Stamboek’, 1976; Strikwerda, ‘Een eeuw Fries stamboekvee’, 1979; Van Adrichem Boogaart, ‘De ontwikkeling van de Nederlandse rundveehouderij’, [1971]; Strikwerda, ‘Melkweg 2000’, 1998.

³⁵³ ‘Schetsen’, 1912, pp. 542-543.

The improvement of the water management system also meant that investments in a better manuring system began to pay off. Everywhere in the dairy farming districts farmers began to construct liquid manure pits at their farms. Nutrients that would otherwise have been spoiled, were now saved and brought on to the land (before, liquid manure was often simply drained away into a ditch). As a result hay yields increased, and the quality of the hay improved as well. At the same time, that is to say after the 1850's, a start had been made to mechanise the harvesting of the hay, as horse-pulled hay rakes and tedders were introduced and spread.³⁵⁴ This was especially so after 1870 when the number of mowers that came each summer all the way from Germany (the *hannekemaaiers*³⁵⁵) rapidly decreased.

As the foraging became more abundant and of a better quality, milk yields improved considerably. During the first half of the 19th century milk yields of normal, good dairy cows in the livestock areas had been as high as 2,700 to 3,000 litres per year (i.e. per lactation period). Of course, there were deviations to lower yields, but there were higher ones as well, and the best cows could even give considerably more. Milk yields of 4,000 to 5,000 litres, or higher, were not unusual.³⁵⁶ About half a century later, in the early 1900's, on well-managed farms in the Zuid-Holland livestock districts milk yields of 4,000 kg had become ever more common, whereas a decade earlier yields of about 3,000 kg had been the average, as reported to the State Commission in 1910.³⁵⁷ During the years 1896-1905 dairy cattle registered in the Friesian herdbook produced an average of 4,130 kg milk per year.³⁵⁸ However, these were yields of highly productive cows that should not be taken as representative for the whole Friesian dairy stock. In general, agro-economists reckoned that by the mid-1930's milk yields in the best parts of the country had increased to more than 4,000 litres; that said, cows producing 6,000 to 7,000 litres were not unheard of at that time. 'The majority, however has a production that will be closer to 3,000 than to 4,000 litres per lactation period', they wrote in 1935.³⁵⁹

From old the islands of Wieringen and Texel (province Noord-Holland) were well known for their sheep keeping, a farming system that also changed rather drastically in the decades after 1845. Traditionally, farmers on these islands had been focused on sheep cheese production. However, the new prospects offered by the British export market caused them to turn to sheep breeding. Sheep of the Texel breed, kept to produce both milk as well as mutton, were now crossbred with English rams (especially of the Leicester breeds) being mutton breeds.³⁶⁰ Milk production (for cheese) was minimised to stimulate the fattening yield. As a result, in a period of just four years between 1851 and 1855 cheese production on

³⁵⁴ Van der Poel, 'Honderd jaar landbouwmechnisatie', 1967, pp. 165-168.

³⁵⁵ Compare: Lucassen, 'Naar de kusten van de Noordzee', 1984.

³⁵⁶ Van der Poel, 'Landbouw in de Noordelijke Nederlanden', 1981, p. 182.

³⁵⁷ 'Schetsen', 1912, p. 564.

³⁵⁸ 'Melkveehouderij', 1947, p. 240.

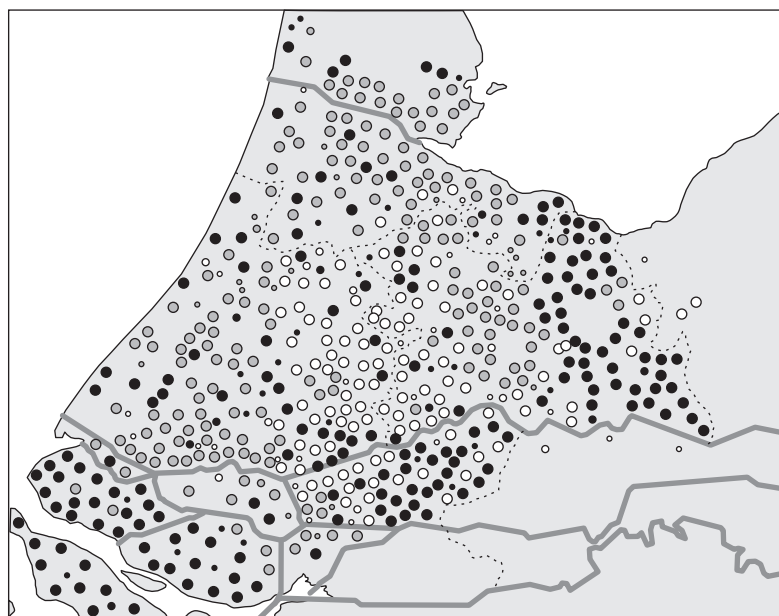
³⁵⁹ Minderhoud, 'De Nederlandsche landbouw', 1935, p. 143. Countrywide, the agricultural statistics show that the average Dutch cow gave about 3,400 litres (with an average fat content of 3.23 %) in the mid-1930's.

³⁶⁰ Van der Vlis, 't Lant van Texsel', 1977, pp. 332-333

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the island of Wieringen fell from 11,800 to 3,900 kg and on Texel even from 46,700 to only 6,500 kg. And by 1880 cheese production had virtually ceased to exist on both islands.³⁶¹

In the Zuid-Holland/Utrecht borderland (the Land van Gouda en Woerden, the Alblasserwaard, the Lopikerwaard and the Vijfheerenlanden) the production of hemp had been reduced as the competition from foreign, imported hemp had increased in favour of cheese production in the course of the 18th century. When, after 1850, the opportunities for the sale of cheese became even more favourable, this process continued in a more enhanced way. Finally, by the end of the 19th century, farm revenues came almost entirely from the sales of cheese and pig fattening as hemp cultivation had virtually ceased to exist (Map 3.3).



- 50 25 10 number of holdings
- ○ ○ farm cheese makers
 - ● ● retail milk producing farms (with government consent)
 - ● ● others (factory dairying farmers)

Map 3.3. Dairy farming holdings in the provinces of Utrecht, Zuid-Holland and a part of Noord-Holland according to the type of farming, in March 1938.

After: Schiere, 'Het bedrijf van de zelfkazers', 1938, pp. 8-9.



³⁶¹ Van Zanden, 'De economische ontwikkeling', 1985, p. 228.

During the first half of the 19th century, three quarters of all British butter imports had come from the Netherlands.³⁶² Thereafter, the exported volume still increased significantly, although the competition from other butter-producing countries became stronger. About the mid-1860's the high quality butter from Normandy (France) even equalled the share of Dutch butter. But that would only be the start of things to come. What happened was that the seemingly endless sales prospects that the British market offered also encouraged all kinds of fraud and tampering with butter. And although this was by far not a new problem – complaints had been heard about this sort of fraud as early as the 17th century – it now became a real threat to the position of Dutch dairy exports. Serious problems also arose from the competition of margarine and the way this new product was added to and mixed with farm butter that was to be exported. Butter merchants from the Brabant region had taken up the production of margarine – ‘oxen butter’ as farmers called it scornfully – in the early 1870's.³⁶³ In 1885, since the share of Dutch butter in British imports still amounted to 45%, this was largely the result of the increasing sales of margarine as well.³⁶⁴ As more and more Dutch butter of dubious quality was shipped to Britain to compete with good quality products from elsewhere, problems grew. And as the price of Dutch farm butter on the London market decreased considerably, the price of butter on the home market (Leeuwarden) dropped from 57 guilders per *vierendeel* (= 40 kg) in 1871-80 to 45 guilders in 1886-95.³⁶⁵

Though, in fact, the problem dated back to the mid-1860's, the turning point in price development came around 1876. From that moment on, things became more serious with every passing year. After the early 1880's in particular Dutch dairy farmers rapidly lost their share of the British butter market, mainly to the Danish. And cheese exports followed a similar course.

It was clear that something had to be done to improve the quality of the product while the intermediate trade had to be shunt off. However, it was only possible to produce high quality dairy products on larger farms – this concerned the production of butter as well as of cheese. And for this reason in the 1870's here and there attempts were made to improve the processing technology or to achieve larger production units. In Noord-Holland – for example – farmers began successfully to establish small cheese factories. Elsewhere in Friesland, where the main product was butter, the Friesian Farmers Society stimulated

³⁶² Blink en Koenen, ‘Algemeen overzicht’, p. 13. Compare also note 340 in Bieleman, ‘Boeren op het Drentse zand’, 1987, p. 770.

³⁶³ Wilson, ‘Geschiedenis van Unilever’, 1970.

³⁶⁴ Bakker, ‘Boterbereiding’, 1991, p. 21 (Table 2).

³⁶⁵ Hylkema, ‘Leerboek der zuivelbereiding’, 1913, pp. 620-621.



Illustration 3.8. The first cooperative steam-driven creamery in Friesland (1886).

In 1886 in the village of Warga (near Leeuwarden, in the province of Friesland) the first cooperative steam-driven creamery in the Netherlands was established, which started its production in March 1887. The photo shows the creamery on the right and the manager's house on the left. Source: Instituut voor Landbouwcoöperatie, Leeuwarden.

attempts to improve the production process on the farms with the help of new Scandinavian technology, the so-called Swartz system.³⁶⁶

All this formed the background to what would finally lead to the emergence of a system of factory dairying, from the late 1870's onwards. Although in fact the movement started with the small cheese factories in the north of Noord-Holland, Friesland was the region where this way of handling the problems had its biggest impact. No wonder that Friesian dairy farmers, like nobody else, had suffered from the export crisis that had come manifest in 1876. It was, however, private entrepreneurs that took the lead, with the establishment

³⁶⁶ According to this system – introduced by Gustav Swartz (1845-1913) in 1864 – milk to be skimmed was poured into containers of c. 50 cm high, made out of tinned sheet-steel with an oblate, oval crosscut. Once filled, these were placed into cisterns with very cold (streaming) water, or preferably iced water. If conditions were favourable, milk fat formed a top layer in the container in about 12 to 24 hours. This layer could be taken off as cream, using a specially shaped spoon. Essential to the system, also known as the 'ice-method', was the fact that the cream was churned while still sweet, which had the advantage that the butter was of a superb quality and could be kept well for a long time.

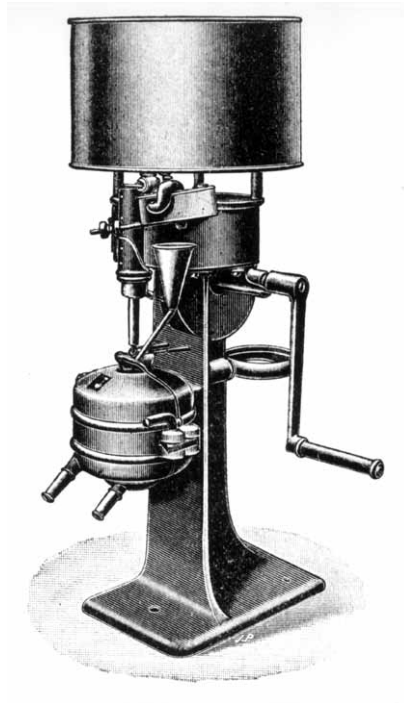


Illustration 3.9. A M lotte cream separator.

In 1879 the Swedish engineer De Laval built a cream separator that brought about a true revolution in factory dairying (butter production). Soon others followed. In 1888 the Belgian smithy Jules M lotte built the first light separator that could be driven manually instead of by steam power. Source: Hylkema, *'Leerboek der zuivelbereiding'*, 1913.

in 1879 of the first private butter and cheese factory in the Friesian village of Veenwouden, called the *Freia*.³⁶⁷ After a number of these private factories had come into existence, the first steam-powered factory on a cooperative basis was established in the village of Warga (c. 6 km south-east of Leeuwarden), in 1886. The founders were 23 dairy farmers who together owned 715 dairy cows, or an average of 31 per farm. In fact, the first of these cooperatives were all established by large farmers in particular. Apparently, they were the ones who still had some financial reserves during this crisis. Others soon followed and by 1898 Friesland already had as many as 112 creameries; 66 of them were cooperatives, the other 46 were private.³⁶⁸ Farmers in other livestock farming areas soon followed. In the southwest of Drenthe, for instance, a large steam-powered creamery was established in the village of Rogat, in 1889.³⁶⁹

³⁶⁷ Nowadays this factory can be seen in the Open air Museum in Arnhem.

³⁶⁸ Geluk, *'Zuivelco peratie in Nederland'*, 1967, p. 53.

³⁶⁹ Bieleman, *'Boeren op het Drentse zand'*, 1987, pp. 389-391.

The breakthrough of these steam-driven factories was greatly stimulated by the arrival of the (steam-driven) cream separator. In 1879 the Swede G. de Laval had managed to construct a machine that worked continuously. In 1906 88% of all butter produced in Friesland was produced in creameries; about two thirds of them were run on a cooperative basis (Table 3.10).

Elsewhere in the Rijnland district, in the province of Zuid-Holland near the city of Leiden, some of the livestock farmers followed another strategy. They had for a long time dedicated themselves to the production of butter combined with skimmed milk cheese (*Leidse kaas*) – low fat cheese. However, from about 1880 onwards, when the price of butter fell, they turned to the production of full cream cheese, the *Goudse kaas* (Gouda cheese). Although the price of this product was also under serious pressure, they probably had very little choice, since the sales (and exports) of their traditional *Leidse kaas* had almost completely dropped off during the last quarter of the 19th century.³⁷⁰ In doing so, this region found a connection with the full cream cheese producing districts in the borderland between the provinces of Utrecht and Zuid-Holland.

Table 3.10. The production of butter and cheese in kg (absolute and in %) on farms and in factories in 4 livestock farming provinces, in 1906.

	On farms		In factories	
	abs. figures	in %	abs. figures	in %
Butter production				
Friesland	460,000	12	13,410,000	88
Utrecht	880,000	67	425,000	33
Noord-Holland	1,553,000	54	1,340,000	46
Zuid-Holland	3,469,000	60	2,325,000	40
Cheese production				
Friesland	100,000	0	27,350,000	100
Utrecht	11,115,000	99	75,000	1
Noord-Holland	10,510,000	58	7,500,000	42
Zuid-Holland	19,330,000	96	870,000	4

Source: Croesen, 'De geschiedenis', 1931, p. 190.



³⁷⁰ Van Cruyningen, 'Boeren in Hoogmade', 2004, pp. 21-22.

From 1890 onwards, as large-scale factory processing of milk into butter and cheese spread, a number of different types of dairy farming systems can be discerned. As milk processing was shifted from farm to factory the so-called *industrie-melkbedrijf* (factory dairying) spread in the livestock district in Friesland, Groningen, Overijssel and in the northern parts of Noord-Holland as well. After these factories had produced butter, cheese and other dairy products from the delivered milk, the participating farmers were given back the skimmed milk, buttermilk or whey. In Friesland, however, the skimmed milk stayed at the factories to be processed into skimmed milk cheese. Elsewhere, the returned skimmed milk, buttermilk and whey were used to fatten calves or pigs. Yet, on most of these farms the fattening of pigs was less important here than it was in the mixed farming district of the sandy soils or in the so-called *zelf-kazers* (farm cheese making) district in the borderland of Utrecht and Zuid-Holland. In Friesland cattle breeding remained an important source of income for many livestock farmers besides dairying.

In the Utrecht-Holland borderland, however, the production of full cream cheese remained on the farm and consequently this region became known for its *zelf-kazers* (farm cheese-making farmers). They used the by-product of their full cream cheese (or Gouda cheese), whey, for fattening pigs. However, unlike events in the eastern and southern sandy districts of the country at that time, pig fattening here was in fact aimed at supplying meat to the towns in the westernmost parts of the country and developed as such especially in the last decades of the 19th century. Between the years 1880 and 1910 the number of pigs in the province of Zuid-Holland had grown from 28,900 to more than 186,300.³⁷¹ And unlike the situation in the sandy parts of the country, pigs here were fattened up to the rather high weight of 150 kg. During the Interbellum period the *zelfkazers* district was known for its very high stocking rate (both of cattle and pigs) in comparison to other livestock areas such as those in Friesland, as well as an extraordinarily high quantity of purchased concentrates (Table 3.11).

After 1890, as the towns in the provinces of Holland expanded, the demand for drinking milk increased as well. And consequently ever more dairy farmers focussed exclusively on producing household milk, the so-called *consumptiemelkers* or *zoetboeren*.³⁷² In the 1930's it was reckoned that to supply Amsterdam alone, a cattle stock of about 30 to 35,000 dairy cows was needed meet the demand of the capital's consumers.³⁷³ Unlike industrial milk, retail milk was not paid for according to its fat content. Therefore, hygienic and other quality criteria on these farms were less high. Consequently, a great deal of the dross of the

³⁷¹ 'Verslag van de landbouw' over 1880 and 1910.

³⁷² Tosseram, 'Het melkwinninggebied van Amsterdam', 1936.

³⁷³ Minderhoud, 'De Nederlandsche landbouw', 1935, p. 62; Tosseram, 'Het melkwinninggebied van Amsterdam', 1936, pp. 84-85

Part 3 – The period 1850-1950

Table 3.11. The intensity in farming in some livestock farming districts, in 1930.

	Number of cattle per 100 ha of farming land	Number of pigs per 100 ha of farming land	Quantities of purchased concentrates in guilders per ha
Zuid-Holland			
Land van Gouda en Woerden	232	292	350.36
Krimpenerwaard	209	468	454.52
Utrecht			
Lopikerwaard	201	246	278.90
Friesland			
Clay pasture district	164	37	62.17
Peat pasture district	155	47	72.62

Source: Minderhoud, 'De Nederlandsche landbouw', 1935, p. 64.

Friesian dairy stock, including tuberculous animals, ended up in these regions, to maintain the flow of household milk.³⁷⁴



Between 1870 and 1890 butter exports had fallen from more than 16 to about 13 million kilograms due to competition problems on the British market. After 1895, however, they increased again to about 39 million kilogram in 1912, the pre-war peak year. Yet, the Dutch dairy sector was not able to regain the share it once had in the British market. After 1895, industrialising Germany rapidly became the most important customer. In 1910, already half of all exported butter went to the eastern neighbours. After a long period of decline cheese exports also increased again.

A crucial factor that contributed to the increase of dairy exports in this period was the introduction of a governmental control mark on butter (*rijksbotermerk*) in 1904. In 1913 a similar government control mark was established for full-cream cheese, followed by three control marks on several sorts of non-full-cream cheese in 1918. The establishment of these control marks should also be seen in the light of more stringent notions of quality, caused

³⁷⁴ Veldink, 'Het weidebedrijf', 1951, p. 361. It was not until 1950 that all Dutch livestock farmers were compelled to become members of a regional/provincial animal health service, which implied that they had to have their cattle stock examined for tuberculosis. Consequently this organisation managed to eradicate tuberculosis completely between May 1951 and May 1956. And from then on livestock farmers were prohibited from keeping any tuberculous cattle.



Illustration 3.10. The cheese market in the city of Alkmaar, in 1923. Oiled cheese (of the Edam-type) is piled up to be sold.

Source: Nederlands Openluchtmuseum, Arnhem.

by stronger international competition. In 1920, the export of butter or cheese that had not been approved and fitted with a State control mark was forbidden.³⁷⁵

On the wave of a recovering economy, the arrival of (cooperative) factory dairying very much stimulated the increase in the number of dairy cattle. Between 1895 and 1930 in the livestock farming regions their numbers grew by one third. Halfway through this period, the outcomes of the cattle census held in May/June 1910 reveal how many animals were kept on a farm (Table 3.12). In the livestock districts in the province of Friesland, an average farm had 16 to 17 dairy cows, with 38% of the farmers owning more than 20 cows. In the Noordwest-Overijssel region these numbers were considerably lower. In the Rijnland and Delfland districts, in the province of Zuid-Holland, an average of 22 dairy cows per farm were counted; about half of the farmers had more than 20 head (Table 3.13).

Countrywide, about half of all milk produced was used for butter production; one fifth was destined for cheese production and about one quarter was sold as retail milk.³⁷⁶

³⁷⁵ Knapp, 'Botercontrole in Nederland' 1927; Bos, 'Brits-Nederlandse handel en scheepvaart', 1978, p. 267.

³⁷⁶ 'Betekenis en bestemming', 1950. p. 29 and 106. These figures also include the quantities that were produced in the sandy districts, where butter production prevailed.

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Table 3.12. The number of dairy cows in the livestock farming districts in the 5 livestock farming provinces, in 1895, 1930 and 1939.

	1895		1930		1939	
	abs. figures	index	abs. figures	index	abs. figures	index
Friesland	74,900	100	91,900	131	110,400	147
Overijssel	31,700	100	46,900	148	67,300	212
Utrecht	46,200	100	65,200	141	69,700	151
Noord-Holland	62,600	100	77,900	124	88,300	141
Zuid-Holland	112,500	100	150,800	134	158,900	141
The Netherlands	327,900	100	432,700	132	494,600	151

Source: Data bank Rural History Group, WUR.

Table 3.13. The average number of dairy cows per farm in the most prominent livestock farming districts in May/June 1910.

	Number of dairy cows per farm
Province of Friesland	
Clay-pasture district	16.7
Peat-pasture district	16.6
Province of Overijssel	
Livestock farming district	6.2
Province of Utrecht	
North-western livestock farming district	18.3
Lopikerwaard	16.8
River IJssel and Oude Rijn clay district	18.0
Province of Noord-Holland	
Middengewest	13.3
Province of Zuid-Holland	
Rijnland	22.3
Delf- and Schieland	21.8
Krimpenerwaard	16.6
Alblasserwaard and Vijfheerenlanden	11.5

Source: 'Uitkomsten der telling', 1912; Data bank Rural History Group, WUR.

The high prices for dairy products that were made during the First World War still continued into the early 1920's. But thereafter, prices became unstable and steadily decreased, year after year. Moreover, in time the competition of margarine grew more fierce, all the more so since the margarine industry managed to make its product cheaper by improving the processing techniques. To make matters worse, in September 1931 Great Britain devalued its currency, and while the Dutch stuck to their 'golden' guilder, the most important competitors in the field, the Danes, followed the sterling. Consequently, dairy prices met their dramatic nadir in 1931.

To save the sector from an almost certain collapse the government promulgated a *Crisis-Zuivelwet* (Crisis Dairy Act) in July 1932. On the basis of an excise duty on dairy products (as well as on substitutes such as margarine, fats and oils) this law enabled the government to pay dairy farmers a supplement to the price of milk. The mainstay of the system was, however, the continuation of a free butter market in Britain, which made it all very unstable. In spite of all kinds of limits imposed on livestock keeping, coupled to this support and meant to reduce over-production, milk production grew year after year. In Friesland, for instance, butter production increased from 18.3 million kg in 1926-30 to 23.6 million kg in 1936-40 (Figure 3.4).³⁷⁷

In spite of the crisis and notwithstanding the restrictions applied to livestock keeping, the number of cattle grew and stock density increased. Except for the increasing amounts of purchased, i.e. imported, feedstuffs, this was also facilitated by new, improved methods of grassland management. And as fodder techniques improved as well, milk yields increased considerably during this rather dark period. In addition to the figures mentioned above, the average milk yield of cows registered in the Friesian Herdbook rose from 4,130 kg (with

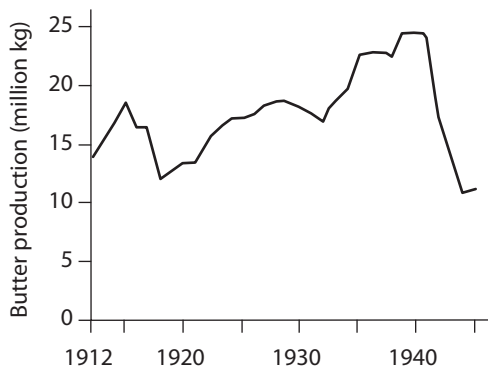


Figure 3.4. Butter production in the province of Friesland, in million kilograms, 1912-45.
After: 'Statistische gegevens', 1947, p. 139.

³⁷⁷ 'Statistische gegevens', 1947, p. 139.

a fat content of 3.17% and 141 kg butter) in the years 1896-1905 to 4,760 kg (with a fat content of 3.80 % and 197 kg butter) in the years 1936-40.³⁷⁸

As the Second World War broke out, export markets were cut off and the import of concentrates and other feedstuffs stopped completely. In addition, grasslands had to be ploughed up in order to increase arable production. Consequently the number of cattle had to be reduced. In 1944 their numbers amounted to as much as three quarters of their numbers before the war. Recently it has been made plausible that due to the efforts that were made to improve fodder methods, milk yields (to overcome the lack of purchased inputs) did not fall as much as contemporary, official statistics suggested. It is assumed that in 1944, total milk production in the Netherlands still amounted to as much as 3.9 million metric tonnes, i.e. only 29% less than the level of production in 1939 and half as much again than the official statistics claimed, which was almost 2.9 million metric tonnes.³⁷⁹ Much of this milk, however, found its way to the consumers clandestinely and in turn contributed significantly to the fact that the food situation up to 1944 was actually much better than was believed possible for a long time.

³⁷⁸ 'Melkveehouderij', 1947, p. 240.

³⁷⁹ Trienekens, 'Tussen ons volk en de honger', p. 264, Table XV.

3.6. Mixed farming in the sandy soil districts

During the 17th and 18th century, farming in the sandy districts, especially in those of Central, East and Northern parts of the country, had become a main producer of cereals like rye and buckwheat. Striking is the way in which contemporary authors speak highly about the large volumes of these products that farmers were able to bring to the markets. At the same time, these authors were well aware of the fact that deficient transport was a factor that complicated the sales of products in these regions. Yet, small rivers and streams – although often too shallow to guarantee constant transportation all year round – appeared to be important channels of transport.³⁸⁰ As for farming on the sandy parts of the province of Brabant in particular, this pattern seems to be more complicated since from the late Middle Ages in this region the sales of butter and fattened calves had already been an important source of income.

After 1850, farmers in these sandy regions reacted promptly to the changing ratio between the prices of livestock products versus those of arable products as well as the prospects foreign markets offered. As livestock prices rose much faster than those of grain, these farmers shifted to the production and sale of butter and pork (living pigs). To do so their rye, buckwheat and potatoes were increasingly used to feed the livestock on their own farm and in doing so former cash crops now became fodder crops. Previously the livestock had served the arable as manure producer; now the arable came to serve the livestock. Soon, increasing quantities of fodder grains and concentrates were bought for this function as well. On an individual farm, like the Stenderink farm near the village of Hengelo (Gelderland), farm income from livestock products increased rapidly during the first decades after 1850. It rose from 61% of the total revenues in 1851-54, to 92% in 1865-69, and finally to 99% in 1875-79 (Table 3.14). Although farmers in the southerly districts had already made this shift in production earlier in the 16th and 17th century, they too now benefited from the increasing opportunities export markets offered them.

In these years in many small country towns in the eastern parts of the country butter markets were established and in the south, in Brabant and Limburg, the number of these market increased.³⁸¹ In a traditional, regional market, like the one in the Drenthian town of Meppel the supply of butter grew so fast that in just a few decades it belonged to the three most important butter markets in the country together with the markets in the Friesian towns of Sneek and Leeuwarden. In addition, the increase in the market supply of cattle and pigs illustrates the fast expanding significance of livestock farming in these sandy regions. Both cattle and pigs stocks increased considerably, the latter in particular. Between 1851 and 1910 the number of pigs in the 5 sandy provinces (Drenthe, Overijssel, Gelderland, Noord-Brabant and Limburg) together grew more than five-fold from 132,000 to more than 723,000.³⁸²

³⁸⁰ Schutten, 'Varen waar geen water is', 1981.

³⁸¹ Van Zanden, 'De economische ontwikkeling', 1985, p. 415 ref. 100.

³⁸² 'Verslag van de landbouw'.

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Table 3.14. Revenues and expenses on the Stenderink farm in Hengelo (Gelderland), in the period 1851-79, in guilders per year.

	1851-54	1855-59	1860-64	1865-69	1870-74	1875-79
Revenues						
From the arable	182	231	219	77	25	7
From livestock	289	567	684	839	1,093	1,168
In total	471	798	903	916	1,118	1,175
Expenses						
To buy fodder, hay and straw	47	123	211	69	265	298
To buy grain	5	14	27	33	41	58
To buy fertiliser	0	0	13	20	29	10
To buy cattle	24	51	42	53	17	58
To buy and maintain implements and housing	79	50	91	130	76	106
Labour costs	50	28	112	114	117	115
In total	205	266	496	419	545	645
Balance	266	532	407	497	573	530

Source: Van Zanden, 'De economische ontwikkeling', 1985, pp. 190-191.

As their numbers increased the exterior of native breeds of pigs changed rapidly as well. Publicists reported that farmers in the eastern parts of the country had begun to crossbreed their native breeds with imported British breeds even before 1840.³⁸³ And in 1852, the annual *Verslag over de landbouw* (the State Report on Agriculture) wrote: 'The new English breeds have now spread all over the country. And generally, farmers are very much pleased with them. The way these pigs grow fat easily is appreciated everywhere, which is important in relation to the demand from abroad'.

All this technological change had far-reaching social consequences as well, since the shift in production aims from arable to livestock products implicated a much more labour-intensive way of farming. Moreover, at the same time the new farming system allowed many people to exist more or less independently on a much smaller type of farm. Consequently, besides the category of the traditional large farmers, a new group of small farmers emerged that tried to make a living on farms that could be worked with the help of only one horse, the so-called *éénpaards-boeren* (one-horse farmers). In Drenthe in particular, demographically one of the fast growing provinces in the country, the number of these smaller, one-horse farms increased from less than 900 in the early 19th century to almost 6,000 in 1910.³⁸⁴

³⁸³ Sloet tot Oldhuis, 'Mededeeling omtrent de teelt', 1846, pp. 39-40.

³⁸⁴ Bieleman, 'Boeren in Nederland', 2008, p. 403.

3.6. Mixed farming in the sandy soil districts

Eventually, according to the results of the agricultural census of 1955 there would be almost 9,600 farms with just one horse (Table 3.15).

However, after the mid-1870's farmers on the sandy soils, like their colleagues in the traditional livestock areas, also had to cope with falling prices of butter. And the falling market supplies were a direct reflection of the strongly decreasing sales of Dutch farm butter in Britain. Increasing competition from high quality products from other exporting countries on the one hand and all kinds of tampering and fraud in the intermediate trade on the other were the cause of this decline. Although individual farmers tried to improve the quality of their butter by new methods of dairying, these efforts were rarely effective. An important obstacle still was and remained the intermediate trade who nullified these attempts by mixing the farmers butter with other, low quality batches or worse.

Ultimately, for farms in the livestock districts, as well as for farmers in the sandy regions the only solution to this problem was large-scale processing, while avoiding the intermediate traders. Consequently, and already shortly after the first cooperative creamery in Friesland (Warga) had been established, steam-driven cooperative creameries were established in the sandy district. At first these were set up mainly in the low lying, grassier parts where stocks were usually higher than in the more elevated parts.

Elsewhere in the sandy districts farmers usually had fewer financial reserves to join the unknown enterprise of establishing a cooperative creamery and times were uncertain. A real breakthrough came about in this area, when a small type of manually operated creamery was introduced, the so-called *handkrachtfabriekjes* where all equipment like the separator(s) and the churn(s) were manually operated; the first one was established in the Noord-Limburg village of Tungalroy, in 1892. Soon others followed and one decade later virtually every village had its own. In 1903, the 5 joint sandy provinces contained as many as 656 creameries (in 1895 there had been about 320) of which 465 (71%) were of the small-scale, manually operated type while most of them were cooperatives (Map 3.4). Drenthian farmers in

Table 3.15. The number of one-horse farms in the provinces of Drenthe, Overijssel, Gelderland and Noord-Brabant in 1807, 1880, 1910 and 1955.

	1807		1880		1910		1955	
	abs. figures	index	abs. figures	index	abs. figures	index	abs. figures	index
Drenthe	890	100	3,430	385	5,950	669	9,588	1,007
Overijssel	3,250	100	4,370	134	10,410	320	14,900	458
Gelderland	4,320	100	7,430	172	13,310	308	19,098	442
Noord-Brabant	11,710	100	17,560	150	18,470	158	20,752	177

Source: Bieleman, 'Boeren in Nederland'; 2008, p. 403.



Map 3.4. The spread of creameries in the Netherlands, in 1903.

After: Bieleman, 'Boterproductie', 1904.

particular proved to be willing to turn to this new method of dairying, and in 1903 in this province 83% of all butter was already being produced in these (cooperative) creameries.³⁸⁵

Soon, however, it appeared that the small, manually operated creameries could not provide the desired quality of butter. And as the economy recovered, after 1900, and the cooperative way of enterprise had been accepted, butter production was concentrated in a smaller number of larger and modern steam-driven factories. Production on a larger scale not only had the advantage of producing a better and more homogenous product. A steam-driven creamery also had the advantage of being able to pasteurise cream and milk. This

³⁸⁵ Bieleman, 'Boterproductie', 1904; Croesen, 'De geschiedenis', 1931, p. 191; Dekker, 'Zuivelcoöperaties op de zandgronden', 1996.

3.6. Mixed farming in the sandy soil districts



Illustration 3.11. A late-19th century steam-driven creamery in Noord-Limburg.

In 1892 in the Noord-Limburg village of Tengelroy the first hand-driven cooperative creamery in the Netherlands was established. Shortly afterwards, in July 1903, the small hand-driven creamery gave way to a modern steam-driven one, here pictured in 1910. Source: Nederlands Openluchtmuseum, Arnhem.

greatly helped to minimise the risk of spreading of all kinds of diseases (like foot and mouth disease), as the skimmed milk and buttermilk were returned to the farmers.³⁸⁶

At the same time, newly established, local breeding societies helped individual farmers to improve their cattle, which was expressed by a real increase in milk yields in this period.



From the mid-1870's, when the sales of butter were falling, pig fattening for some time remained the mainstay of the farmers' business. On this front, farmers truly enjoyed the advantage of the falling prices of fodder as well. Most of the pigs that were exported – about two thirds – were sent alive to Germany. However, in 1894 and 1895 respectively, Germany and Britain closed their borders for the importation of livestock for protective reasons and consequently the sale of pigs declined drastically. Shortly before, however, the exportation of fresh pork to Britain had increased and soon this would increase even more: from about 5,000 tonnes in 1886, to 12,500 ton in 1895 and even 26,800 tonnes in 1903.³⁸⁷ Farmers,

³⁸⁶ It was not until 1915 that a statutory obligation for pasteurising skimmed milk and buttermilk became effective. This measure brought an end to the very few *handkrachtfabriekjes* that had survived until then. Dekker, 'Zuivelcoöperaties op de zandgronden', 1996, p. 213.

³⁸⁷ Reens, 'De vleeschexport', p. 72; 'Verslag van de landbouw' over 1903, pp. 142-143.



Illustration 3.12. A cooperative steam-driven creamery in Overijssel (c. 1913).

In 1901 a group of butter producers and merchants established a steam-driven creamery in the village of Heino, in Overijssel. After about eleven years the company was changed into a cooperative when a number of local farmers took over. In 1913, the year that is on the name-board, the creamery processed the milk of 1,118 dairy cows. Source: Vereniging van heemkunde Omheining, Heino.

especially those of the sandy districts, benefited from their geographical situation in relation to this British market and the new means of transport (railways and regular shipping lines), applied themselves to this market niche. The demand was for a lightly fattened pig (40-60 kg), which soon became known as *Londense biggen* (London piglets). In connection to this new trade, many meat-packing factories were established, which in turn stimulated this trade in their direct vicinity. In 1913, there were 111 in the Netherlands altogether, a majority of them to be found in the 5 sandy provinces; almost of them had direct access to the national railway network.

Remarkably, this type of pig fattening was especially suited to small farmers and land labourers, as the money invested to buy piglets could be earned back in a relatively short period of time. Together with the skimmed milk and buttermilk from their one or two milking cows (which was returned to them from the cooperative creamery), some rye and potatoes and some bought fodder, they now were able to fatten these pigs to the desired weight in some 16 to 20 weeks of time. Thus, cooperative dairying combined with this

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special form of pig fattening very much stimulated the growth of the number of small farmers. In the 5 sandy provinces the number of farms with 1-5 ha of land increased from almost 57,200 in 1890 to 73,200 in 1910. In the 14 agricultural districts together forming the *Zandgebieden*, more than 45,700 or 58% of the total number of 79,100 farms belonged to this category with 1-5 ha of land.

According to their number of cattle, it is also obvious that small farming prevailed on the sandy soils of the Netherlands (Table 3.16). According to the results of the cattle census of 1910, almost two thirds of all farmers only had up to 5 head of cattle.

Of course, the opportunities to build up a living on one's own farm was also facilitated as cheap good quality fertilisers became available after about 1900. Once farmers had become familiar with the prospects cooperatives offered, they were also willing to join the many local buying societies that were established in these times, benefiting from the advantages of scale these societies offered. Earlier, the scarcity of nutrients had seriously limited the opportunities to reclaim parts of the commons and to increase productivity. Once fertilisers had become available, sheep – the most prominent manure producers in the sandy districts until then – were reduced drastically, and virtually disappeared altogether before the 1920's. Sheep keeping to produce wool had already become unprofitable, now sheep were no longer needed to produce manure either.

Artificial fertilisers not only helped farmers to increase the productivity of their crops. It also enabled them to reclaim a part of the waste lands that had been used as common pastures until then. Already after 1850, as land prices had increased rapidly, large parts of these commons – especially lower parts – had been enclosed and turned mainly into grassland. This was, of course, partly due to the increasing profitability of cattle farming at the time. The legal framework that formed the basis of this came about after the acceptance

Table 3.16. The number of farms according to their number of cattle (all categories), in the sandy districts of the Netherlands, in 1910.

Number of cattle	Number of farmers	
	abs.	in %
1-2	36,243	34
3-5	30,710	28
6-10	22,959	21
11-20	13,414	12
≥21	5,611	5
Total	108,937	100

Source: Data Bank, Rural History Group, Wageningen University.

of the *Markewet* (Enclosure Act) in 1837. This law implied, in fact, a confirmation of two laws which had been established previously, during the French regime (in 1809 and 1810), but had remained more or less a dead letter since then.³⁸⁸ During the 1920's and 1930's in particular, governmental subsidies became available as unemployment relief and large parts of the former commons which had been left to waste land up to then were now turned into large-scale farming land and many modern farms were established.³⁸⁹

Of course, existing farms also benefited from the prospects that fertilisers offered, enabling them to extend their area of farming land. Consequently in 1947, rural sociologists found that in the sandy districts one third of all the farming land of farms with 1-5 ha of land was reclaimed after 1900. For the category 5-10 ha the share of newly reclaimed land amounted to as much as 36% and for larger farms it was even as high as 39%.³⁹⁰ In the beginning of this period barbed wire came into use. It had been introduced in the Netherlands as early as 1881 but it now became a characteristic new feature of the landscape in the sandy parts of the country.

At an early stage, fertilisers were used especially for reclaiming grassland, partly due of course to the increasing profitability of cattle farming. Later on, the arable also benefited from it. As new varieties of rye (e.g. Petkuser rye) adapted to the increasing use of nutrients were introduced, yields increased. In the period 1881-90 the old, regional land races had produced an average of 18 to 19 hl/ha (1,250 - 1,350 kg/ha), in 1931-35 the average yield of winter rye had increased to as much as 37 hl/ha (2,587 kg/ha).³⁹¹



Meanwhile the mixed farming system on the sandy soils developed further as poultry keeping grew to become an important and integral part of it. Before 1906, the Netherlands had been a net-importing country for eggs; afterwards exports rapidly exceeded imports. By 1910, the net exports amounted to 7.6 million eggs and two decades later this had gone up to more than 1,400 million. This fast and striking emergence of egg production as a part of mixed farming was realised after dairying had shifted from farm to (cooperative) creamery allowing the (female) labour that became available to be deployed in poultry keeping.

However, poultry keeping would not have been as successful as it was, if farmers/poultry-keepers had not organised themselves into cooperative-like societies to profit from all kinds of benefits-of-scale. Also typical was that from 1918 onwards, but even more so in the 1930's, a system of labour division evolved: special breeding farms were established – often as a local cooperative – that applied themselves to produce and select highly productive chickens. These breeders sent the young chickens (both hens and roosters) to so-called multiplication farms to produce fertilised eggs, which were eventually delivered to hatchery farms.

³⁸⁸ Demoed, 'Mandegoed schandegoed', 1987.

³⁸⁹ Thissen, 'Heideontginning', 1993. Bieleman, 'Veranderend boerenland', 2000.

³⁹⁰ Maris, 'Enkele aspecten', 1951, pp. 35-38.

³⁹¹ 'Verslag van de landbouw'.

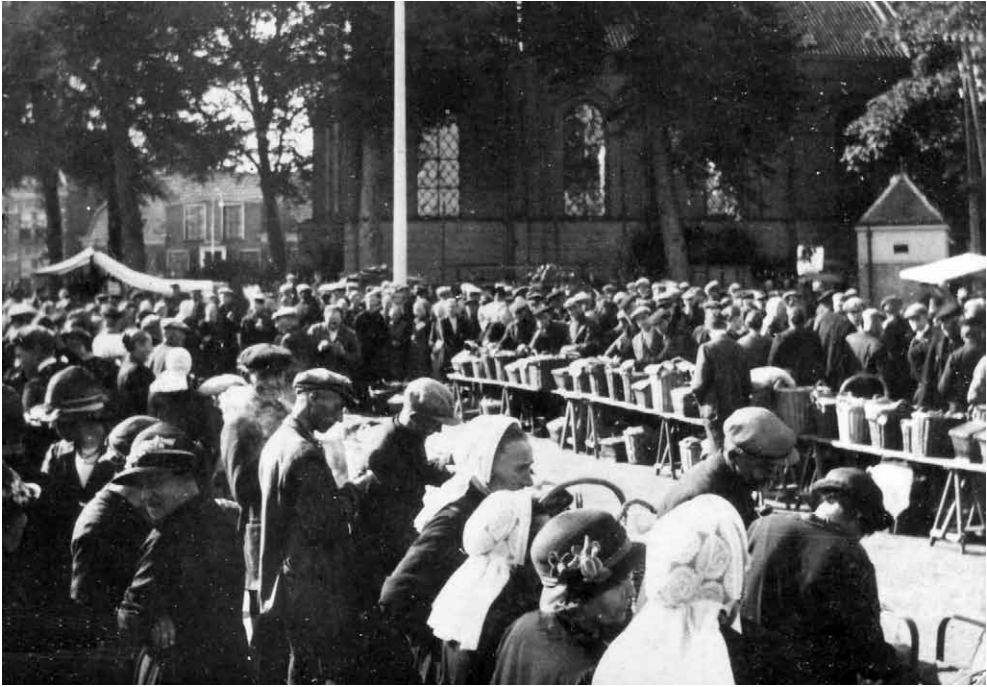


Illustration 3.13. A weekly egg market in Overijssel (c. 1935).

During the first decades of the 20th century poultry keeping was booming business in the sandy parts of the country. In many places weekly egg markets were established where farmers – or rather the farmers' wives – put their eggs up for sale to the dealers. This photo shows the weekly monday egg market in the village of Heino (in Overijssel) in 1935. Source: Vereniging van heemkunde Omheining, Heino.

Until the 1960's, these hatcheries were the last link in the production chain of young laying hens. They sent the day-old chickens to the farmer/poultry keepers. Incubating itself had reached completely different dimensions in the 1920's when new 'mechanised' incubators were introduced.³⁹² These machines facilitated the enormous expansion of poultry keeping before World War II: in 1890 the 5 sandy provinces had about 1.5 million chickens, while in 1910 there were 4.1 million. Again this number increased to as much as 16.3 million in 1940. In these years, egg markets had been organised in many villages on a weekly basis. Here, farm women – who had in fact got poultry keeping off the ground – could sell their eggs to merchants. Elsewhere egg auctions were established. By far the biggest of these auctions was the Cooperative Egg Auction in the town of Roermond (in Limburg) which was founded in 1904. In the pre-war peak year of 1930 more than 222.5 million eggs were delivered to this auction (Figure 3.5).

³⁹² Bieleman, 'De legkippenhouderij', 2000, pp. 154-179.

Part 3 – The period 1850-1950

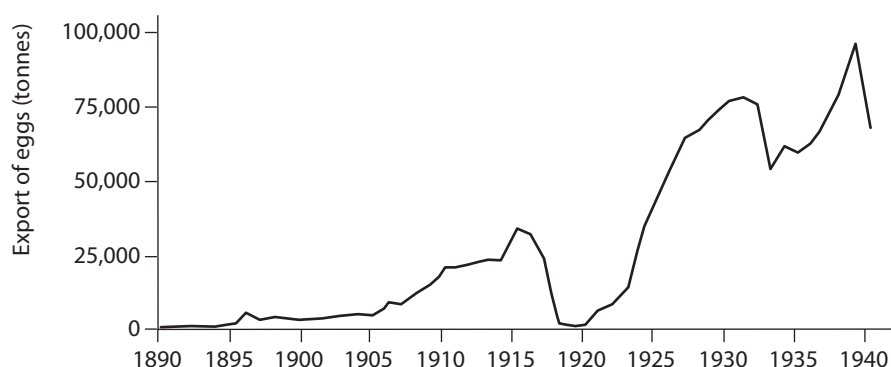


Figure 3.5. Exports of eggs in tonnes, 1890-1940.

After: Pilat, 'Dutch agricultural export performance', 1989, Table C.1.B. (1894-1910); 'Verslagen van de landbouw' (1911-1940).

Also because of this explosive growth of the poultry sector the Netherlands was the third in the list of maize-importing countries in Europe after Britain and Germany on the eve of World War I in 1913. In 1932 the net imports of maize had increased to as much as 1.7 million tonnes, almost four times as much as before the war.³⁹³

In 1930, the German agronomist Frost characterised poultry keeping as it was performed on the often small farms in the sandy districts of the Netherlands justly and touchingly as a *dezentralisierte Großindustrie*.³⁹⁴ It was estimated that on these small mixed farms poultry keeping contributed up to more than one fifth of the farming income; pig fattening another fifth, although these figures varied of course from region to region and in some regions they were significantly higher than this average.³⁹⁵



While mixed farming in the sandy districts flourished after 1890 many people had closed their eyes to the fact that it was almost entirely dependent on the sales of its products on foreign markets, as well as that it was strongly based on the supply of 'raw materials' like fodder, concentrates and fertilisers from abroad. The first time farmers were confronted with the economic vulnerability of their business was during World War I. Although the Netherlands were not directly involved in war actions, they were cut off economically from the outside world. Consequently the numbers of pigs and poultry were reduced drastically.

³⁹³ Reens, 'De vleeschexport', 1922, p. 76; 'Verslag van de landbouw'.

³⁹⁴ Frost, 'Die Holländische Landwirtschaft', 1930, p. 144.

³⁹⁵ This goes for farms with 4-7 ha of land. Maris, Scheer and Visser, 'Het Kleine-boerenvraagstuk', 1951, p. 61 Table 4.

3.6. Mixed farming in the sandy soil districts

In 1926 again, farmers were to become harshly aware of their dependency on the British market in particular. In that year and totally unexpectedly, Britain closed its borders to Dutch fresh pork, the *Londense biggen*. Although officially proclaimed as a veterinary-hygienic measure, the step was of course a means of protection for the British pork producers. Consequently, Dutch farmers had to make overnight changes, shifting to the fattening of pigs of a much heavier weight, in order to produce bacon. This was an area in which they and the meat working industry had very little experience. Much worse, however, was the fact that the export market (read: the British import market) for bacon was heavily dominated by Denmark, as Danish farmers had applied themselves under similar conditions to this 'niche' at a much earlier stage.

The events of the year 1926, however, were still only an omen of worse things to come, as the agricultural economy gradually turned into a surplus economy, in the course of the 1920's. The crisis that was at hand grew grimmer in 1928 as prices fell, although initially falling grain prices meant a stimulant for livestock farming. Things turned bad for this sector when Britain gave up the gold standard while our competitors – the Danes – followed the sterling with their crown in the autumn of 1931. To give a helping hand to the many small farmers in the sandy parts of the country, the government promulgated a Crisis Dairy Act (*Crisis-zuivelwet*) and a Crisis Pig Act (*Crisis-varkenswet*).

The first measure, the *Crisis-zuivelwet*, was meant to make dairy farming profitable again and to guarantee farmers a minimum price for the milk they delivered to the creameries (Figure 3.6). The *Crisis-varkenswet* gave the authorities the opportunity to put a levy on the consumer prices of pork to form a stabilisation fund, which in turn was used to buy bacon pig from the market at a price which was higher than the London meat market prices. The *Varkenscentrale*, the governmental apparatus that was established to execute this regulation,

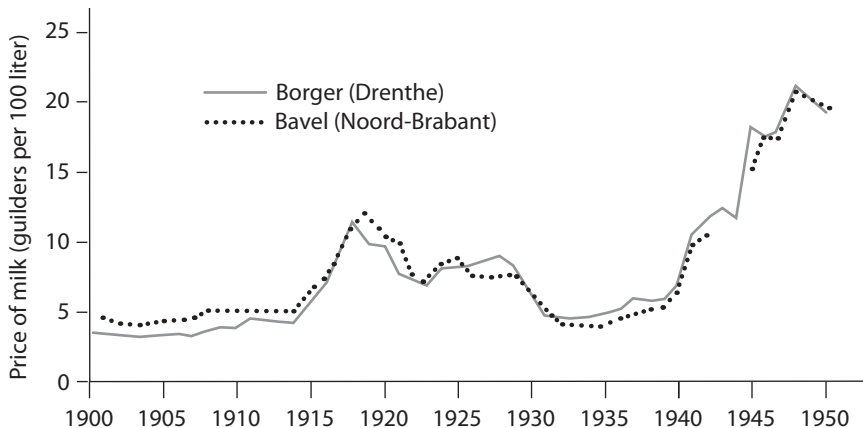


Figure 3.6. The price of milk paid to farmers by the cooperative creameries in the villages of Borger (Drenthe) and Bavel (Noord-Brabant), in guilders per 100 kg delivered milk, 1894-1950.

After: 'Zestig jaar', 1954; Hulshof, 'Boter in Bavel', 1986.

paid farmers strictly according to the quality of their pigs. This was meant to stimulate quality improvement in pig farming as a means of consolidating the position of Dutch bacon on foreign markets. However, it could not prevent export prices falling from 1.05 gld/kg of bacon in 1929, to 0.62 gld/kg in 1932, and finally to 0.50 and 0.54 gld/kg in respectively 1935 and 1936. However, all regulations meant to support the prices farmers got for their products would have had no effect if at the same time they had not been accompanied by some far-reaching measures to prevent both sectors from over-production.

The system of labour division in poultry keeping, that had evolved after the First World War, now became virtually downright and compulsory as part of the production regulations for this sector that were proclaimed at the end of 1933. An important aim of these regulations was also to stimulate quality improvement and an increase in production per hen as a means of decreasing the overall running costs of the destitute farms. The latter indeed resulted in a spectacular increase in productivity from an average of about 116 eggs per hen in 1933 to about 160 on the eve of World War II. Another example of the way this sector improved its performance was that during the years 1934 and 1935 the average weight of eggs that were delivered to the Cooperative Egg Auction in Roermond (Limburg) increased from 57.8 to 58.6 grams.³⁹⁶

Production regulations like the ones that were decreed in pig and poultry keeping put small farming in particular at a relatively serious disadvantage. The already low standards of living on these 'mini-farms' had steadily declined since the late 1920's, and finally – in the course of the early 1930's – led to a situation of true impoverishment (Box 3.1). When it was realised that these small farmers in particular were relatively hit hard by the operative restrictions, the very stringent regulations they implied were loosened slightly for them. Moreover, for the same reason a special organisation was set up in 1936, the *Dienst voor de Kleine Boerenbedrijven* (the Small Farmers Service), to coach this group of industrious workers through the exceptionally bad situation they had to cope with. In spite of all the crisis measures that were taken, the situation in mixed farming as a whole remained bad until 1937.

When World War II broke out, a surplus economy had to be transformed into an economy of scarcity. As grain supplies from overseas were cut off, inland grain production became a top priority. For the mixed farms of the sandy soils, it implied a full reorganisation of the prevailing farming system as they were expected to deliver as many arable crops as they could to the governmental organisations to supply the home market. For the same reason the ploughing up of grassland was stimulated. As pigs and poultry were the direct competitors of humans in terms of caloric supply, their stocks had to be cut back drastically. Consequently the number of hens fell from 34.9 to 10.4 million between June and December 1940, and finally to 3.0 million in the winter of 1941-42, which was less than 10% of their pre-war numbers. In March 1942, the number of pigs only amounted to 24% of their numbers at the beginning of the war. The stock of cattle remained stable through the war years, after a small reduction during the first summer of the war.

³⁹⁶ Bieleman, 'De legkippenhouderij', 2000, p. 160.

3.6. Mixed farming in the sandy soil districts

Box 3.1. A description of a small mixed farm in the municipality of Raalte in the sandy part of the province of Overijssel, during the crisis years 1936-37.

The crop regulations laid down by the government within the framework of its crisis legislation from 1932 onwards, proved to be fatal for small farming in particular and hit this category of industrious workers disproportionately hard. Nowadays – hardly 75 years later on – it is almost impossible for us to get an idea of the distressing conditions under which these people had to live and work. In 1937 the Small Farmers Service of the ministry of Agriculture reported about the living conditions on just such a small farm in the municipality of Raalte in the sandy part of the province of Overijssel:

‘The farmer’s family consists of a man, his wife, 7 children, a grandfather and a disabled sister. The size of the small holding is 3.20 ha, of which 0.50 ha is arable land and the remaining is grassland. The arable is used for cropping potatoes for the family’s daily necessities and for the pig stock; sugar beets (4,000 kg) for stock feed and rye (5 hl) for the family’s own use. Because the family needs 10 hl of rye annually, an additional 5 hl has to be bought elsewhere. The family is unable to take advantage of the governmental aid fund for arable farmers, because of the fact that their rye crop is not denatured but delivered to a local bakery, the sugar beets are fed to the stock and potatoes are used mainly by the own family.

The farmer has 4 dairy cows. Of the two calves that were born one is kept to be raised as a milking cow; the other will be sold at the age of half a year. Next, there are a breeding sow and 4 other pigs; 14 piglet marks were allocated¹. The pigs are sold the moment they have been brought up to a weight of 120 to 130 pounds, and the financial revenues from this are used to pay the mortgage rent. To feed a number of 50 hens mixed feed is bought annually to an amount of 150 guilders. There is no horse on the farm. For the ploughing of the arable a horse is hired, on the payment 2.50 guilders daily. Spading the small area of arable land is out of the question!

The farm’s value is about 5,000 guilders. The mortgage amounts to 4,000 guilders at 4½%, so 180 guilders for rent have to be paid annually. The fire insurance costs 24 guilders annually.

Finally some remarks have to be made about the nourishment of the family. For breakfast they eat pancakes, for which every 10 days 25 pound of buckwheat flour is needed. At noon they eat potatoes with some additional fat, usually no bacon or meat. Sometimes they have some brown beans. They do not eat vegetables. For supper they eat rye bread and white bread with lard or margarine. So, their nourishment is rather limited, consisting mainly of carbohydrates and a little fat. The garden is only a few square metres and fruit trees are absent. Less tea or coffee is consumed than in former times’.

(Source: ‘Rapport over den sociaal-economischen toestand’, 1937, p. 380).

¹ The number of piglet markets allocated by the local crisis committee to each farmer according to the size of his business, determined the number of pigs a farmer was allowed to raise.

3.7. The *Veenkoloniën* – arable farming on former peat soils

From an agro-geographical point of view the name *Veenkoloniën* (literally: ‘peat colonies’) is usually applied to a group of seven municipalities in the south-eastern part of the province of Groningen, six municipalities in the adjacent parts of the province of Drenthe and the municipality of Smilde in the same province. The Groningen municipality of Slochteren was also assigned to the agricultural district called the *Veenkoloniën*.³⁹⁷ In 1910, these municipalities together represented about 4% of the total agricultural area in the Netherlands speaking in terms of their area of farming land.³⁹⁸ The *Veenkoloniën* as settlements owed their genesis to the fact that from the early 17th century onwards specially established companies (*Compagnieën*) began to extract turf from the vast and inaccessible moors southeast of the city of Groningen. These moors were in fact a part of the even larger *Bourtanger Moor* which stretched further east, far into present-day Germany.³⁹⁹

From the early beginning, the city of Groningen played an important role as it strongly regulated all that happened in its *koloniën*. The city council not only made rules for the spatial layout, but it also dictated that the grounds that remained after the turf had been removed were to be brought under agricultural cultivation. Colonists then transformed the denuded areas into agricultural land by mixing the topmost peat layer (*bolster* or *bonk* – which was useless for making turfs) with the underlying (Pleistocene) sand.

To favour the draining of the 3 to 5 metre thick layer of peat and an efficient transportation of the turf, an adequate and dense network of canals and sub-canals (*wijken*) were dug. Usually these *wijken* were dug at a distance of 170 to 200 metres, parallel to each other. Between every two *wijken* lengthwise two holdings (farms) were situated besides each other, separated by a smaller ditch. When carried out as efficiently as possible, these holdings were about 12 to 15 ha. This systematic layout of the *Veenkoloniën* had a major, stimulating impact on the development of agriculture in this farming district as all plots had access to navigable water.

One of the main problems for the *Veenkoloniën* farmers was maintaining the fertility of the former sub-soil, now being top soil, which consisted in fact of pure, infertile sand and *bolster*; the former topsoil of the moor. And although mixing it with the *bolster* layer created rather good physical growing conditions for their crops, the soil was still very poor in nutrients. For this reason the returning turf barges brought in large quantities of street sweepings (or *straatvuil*) and compost which were brought on to the newly reclaimed land as fertiliser. In the beginning this town refuse compost came from the city of Groningen

³⁹⁷ Strictly speaking, this municipality was not a *veenkolonie*, but farming did show a great similarity to farming in the real *Veenkoloniën*.

³⁹⁸ ‘Het grondgebruik in Nederland’, 1912, especially p. 177.

³⁹⁹ There is a lot of literature about the history of the *Veenkoloniën*, though much of it is quite dated. The following text is based on: Keuning, ‘De Groninger Veenkoloniën’, 1933; Keuning, ‘De landbouw in de Veenkoloniën’, 1943; Keuning, ‘De ‘Gronings-Drentse’ Veenkoloniën’, 1955; Ten Rodengate Marissen, ‘Grondverbetering, Part II’, 1932; Priester, ‘De economische ontwikkeling van de landbouw in Groningen’, 1991; Gerding, ‘Vier eeuwen turfwinning’, 1995.

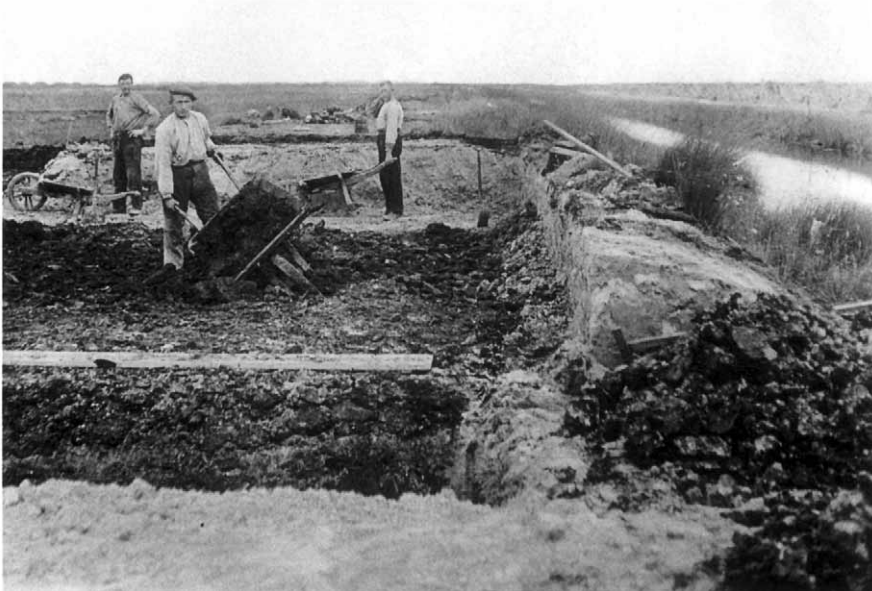


Illustration 3.14. Preparing the typical Veenkoloniën soil.

From the early 17th century onwards, but especially after 1850 the former peat wilderness that stretched into the eastern parts of the provinces of Groningen and Drenthe was converted into one of the most modern and industrialised farming regions in the Netherlands: the Veenkoloniën (= peat colonies). After the peat had been cut into turfs, dried and then taken away, colonists transformed the denuded area into agricultural land by mixing the topmost peat layer (bolster or bonk – which was useless for making turfs) with the underlying (Pleistocene) sand. This process of toemaken (preparing) was, of course, very labour-intensive. Source: Drents Museum, Assen.

only. Soon, however, it was supplemented by waste from all the northern Dutch cities, as well as from cities like Amsterdam, Haarlem, Alkmaar, and Enkhuizen. Even night soil from North German cities like Emden and Leer was shipped to the *Veenkoloniën*. At first it was available to the settlers for free, but before long the town refuse became a necessary and costly commercial commodity.

In addition to this town refuse farmers also bought substantial quantities of farmyard manure, as well as so-called *terpaarde*⁴⁰⁰ and clay. In the course of the 19th century, however, the former tended to get more and more scarce and therefore ever more expensive. Yet, *Veenkoloniën* farming remained a type of mixed farming system as quite a large number of livestock was also kept for the same reason as this was done on the arable farms in the marine clay districts.

⁴⁰⁰ *Terpaarde* is the (very fertile) soil that was excavated from ancient, artificially raised dwelling mounds in the northern coastal plain.

3.7. The Veenkoloniën – arable farming on former peat soils

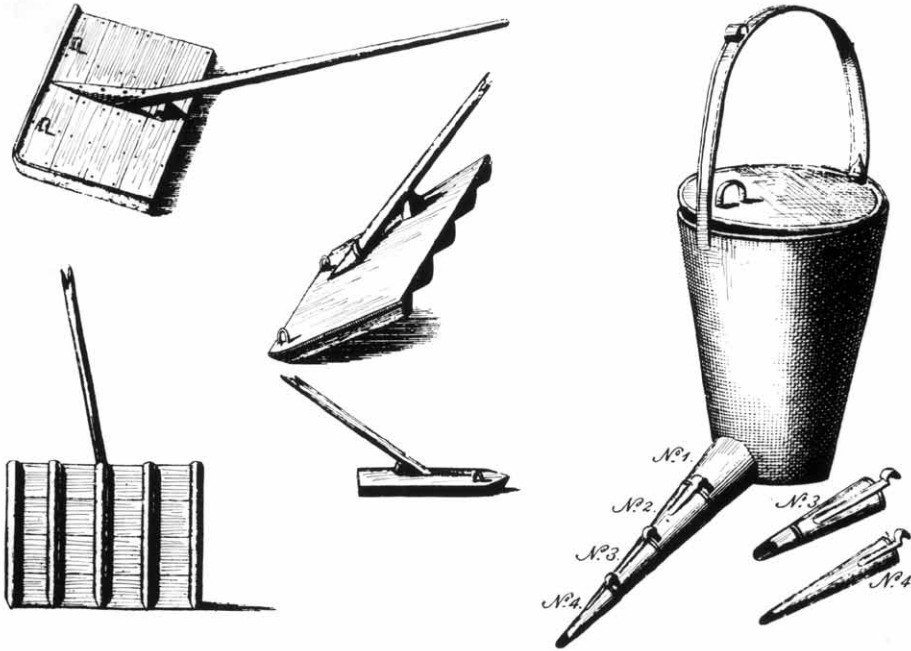


Illustration 3.15. Various implements used for row cropping in the Veenkoloniën region in the 18th century. Source: 'Magazijn van vaderlandschen landbouw', 1810.

One drawback to this massive use of composted town refuse was the fact that it came with many kinds of weed seeds. Because of this, the arable in the *Veenkoloniën* district was infamous for the many weeds polluting the arable. In fact, the problem was so serious that fallowing the arable regularly – in those days a general method applied to control weeds – did not work here. For this reason *Veenkoloniën* farmers introduced the method of row cropping way back as early as the middle of the 18th century. Traditionally the method is believed to have been introduced by a group of Mennonite refugees coming from the German Paltz, and then row cropping was adopted generally in the region 'very rapidly' as was reported.

Initially the composition of the sown area in the *Veenkoloniën* farming system was not very different from the one in the adjacent sandy regions. Grains, like rye and barley, dominated it in particular and from the 18th century onwards buckwheat also played an important role. The latter crop helped the farmers in the persistent struggle with weeds. Wheat and other non-food crops were hardly to be seen in the *Veenkoloniën*.

At an early stage potatoes became an important crop, especially as they were seen as a valuable preparatory crop on newly won arable land. In fact, both buckwheat and potatoes were the farmers' 'brothers-in-arms' in their struggle against weeds. As such, potatoes must

have been introduced sometime in the first decades of the 18th century and soon sizeable quantities were shipped, even to the North German cities of Bremen and Hamburg.



After 1860 the practice of processing potatoes into starch on an industrial scale decisively changed the development of *Veenkoloniën* farming, virtually turning it into a mono-cropping system. After that time, potato cultivation dominated farming here, as nowhere else in the country. From the early days onwards, the British textile industry was the most important sales outlet for starch.⁴⁰¹

Even before the arrival of the starch producing industry some entrepreneurs had begun to make malt spirit (*jenever*) from potatoes. In 1840 there were as many as 17 distilleries in the region using potatoes as their basic ingredient. But in 1845 and the following years the potato blight put an end to the profitability of the industry, and most of the distilleries had to close. Around the same time – in 1840 – the first starch factory had been established in the town of Muntendam, but this too went broke some years later. The start of the *Veenkoloniën* potato starch industry is said to have begun when the entrepreneur W.A. Scholten established a factory in 1842. This was followed by others, in particular during the years 1860-65.⁴⁰² On the eve of the depression of the 1880's there were already about 18 (private) factories active in the region. And despite the depression the quantities of starch to be exported increased undisturbed, year after year (Figure 3.7).

In 1897, Scholten's son, J.E. Scholten, took the initiative to establish a cartel together with other – private – starch producers. As a reaction, and also due to growing resentment which was sharpened by the falling prices, farmers came together to form their first, own cooperative, starch factory – *De Eersteling* (the Firstling) – in Borgercompagnie (municipality of Veendam) in 1898. And they were very successful: by 1911, the joint cooperatives produced more than the private ones put together, namely 3.7 compared to 2.2 million hectolitres. Consequently and to the advantage of their sales, these cooperative factories established a sales agency, the *Aardappelmeelverkoopbureau* (Potato starch sales agency), or AVEBE for short, in 1919.

As the potato starch industry grew, the area under potato expanded drastically, despite the depression of the 1880's and 1890's. And although potato prices did fall, *Veenkoloniën* farming was not hit as badly by the depression as other farming sectors. An important reason behind this was the introduction of artificial fertilisers. Since the beginning of *Veenkoloniën* farming there had been a significant increase in the money farmers had had to spend on town refuse and other kinds of manure. It was estimated that in 1880 the total costs for buying these products amounted to as much as one third of the total running costs of the farm (Table 3.17).⁴⁰³ It was mainly for this reason that the use of artificial fertilisers expanded

⁴⁰¹ Minderhoud, 'Ontwikkeling en beteekenis', 1925, pp. 88ff; Everwijn, 'Beschrijving van handel en nijverheid', 1912, p 582.

⁴⁰² Knaap, 'Voor geld', 2004.

⁴⁰³ 'Uitkomsten', 1890), XVII, pp. 14-15.

3.7. The Veenkoloniën – arable farming on former peat soils

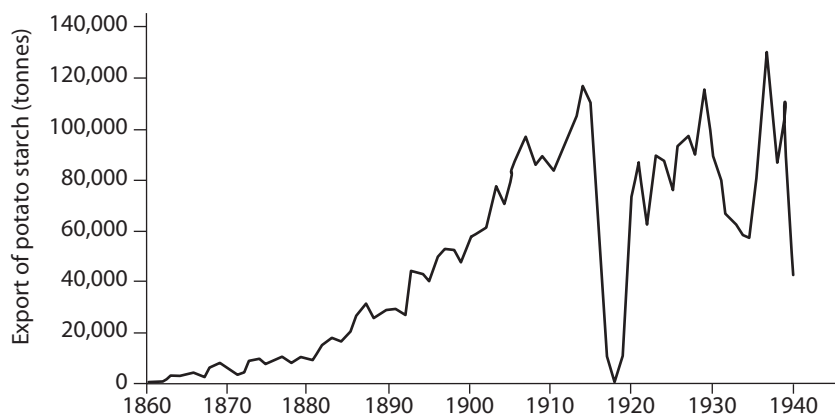


Figure 3.7. Exports of potato starch in tonnes, 1860-1940.

After: Pilat, 'Dutch agricultural export performance', 1989, Table C.1.D. (1894-1910); 'Verslag van de landbouw' (1911-1940).

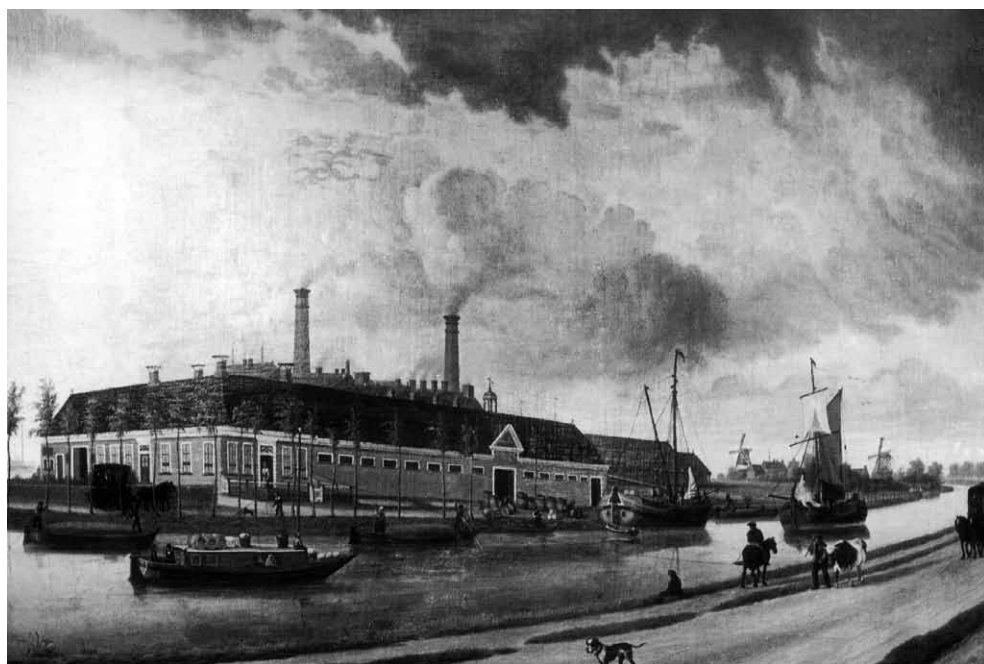


Illustration 3.16. Potato starch factory in Foxhol (c. 1868).

In 1841 entrepreneur W.A. Scholten put into action his first potato starch factory in the village of Foxhol, at the edge of the Veenkoloniën district. When his enterprise, called Eureka, proved to be successful Scholten expanded his starch production by establishing similar factories in other villages, especially after 1865. Source: Het Drents Museum, Assen.

Part 3 – The period 1850-1950

Table 3.17. The annual revenue and expenditure on a farm in the Veenkoloniën district in Drenthe in 1906-10 in guilders. The farm had 42 ha of land and was reclaimed in the years 1897-1904.

Revenues	in guilders	in %	Expenditures	in guilders	in %
Potatoes	16,561	64	Wages in cash	1,051	32
Rye	2,733	11	Wages in kind	130	4
Oats	2,166	8	Manure	1,733	53
Peas	1,121	4	Maintenance	134	4
Beans	577	2	Taxes and other charges	79	2
Straw (of rye and oats)	1,951	8	Clover seed	40	1
Livestock	775	3	Others	126	4
Total	25,884	100	Total	3,293	100

Source: 'Overzicht', 1912, pp. 416-418.

very rapidly. In 1896 the State agricultural adviser reported: 'Right now, the time has come for a *Veenkoloniën* farmer to be able to run his farm without the use of compost and in doing so he is able to keep his head above water as prices decline.'⁴⁰⁴ Already in 1903, in the (seven) joint Groningen *Veenkoloniën* municipalities the cost of buying artificial fertilisers amounted to as much as 4,877 guilders per 100 ha of farming land, while the average for the whole country was still only 437 guilders.⁴⁰⁵

The spread of artificial fertilisers radically changed *Veenkoloniën* farming. In the first place the area of farming land could be expanded considerably, despite the depression. Secondly, farmers became much more free in their cropping system (Table 3.18). Rotations could be simplified and as a consequence farmers had the opportunity to grow potatoes every other year. In addition, grasslands were turned into arable as the number of cattle was drastically reduced. In particular, on the newly reclaimed grounds two thirds of the arable was soon under potatoes, the majority being industrial potatoes.

The solution to the manuring problem meant that potato yields increased too. This was, of course, also the consequence of breeders constantly supplying new and more productive breeds. In the years 1873-78 the average yield of potatoes in the Groningen *Veenkoloniën* had been as high as 237 hl/ha; for industrial potatoes the results had gone up to as much as 350 hl/ha in 1901-10. But in many cases yields of 500 to 600 hl/ha could be produced. In the period 1921-30 the average yield of industrial potatoes had gone up to 397 hl/ha.⁴⁰⁶ As crops became more abundant weeds had less of a chance, and therefore became a much smaller problem for farmers.

⁴⁰⁴ Bieleman, 'Boeren op het Drentse zand', 1987, p. 621.

⁴⁰⁵ 'Overzicht', 1912, pp. 372-373.

⁴⁰⁶ 'Veslag van de landbouw' over 1914, p. 142; 'Overzicht', 1912, pp. 384-385.

3.7. The Veenkoloniën – arable farming on former peat soils

Table 3.18. The relative crop assortment in the Veenkoloniën in the provinces of Drenthe and Groningen in 1921-25 and the density of cattle in cattle units per 100 ha of farming land in 1921.

	Groningen	Drenthe
Grains	47	45
Pulses	1	3
Industrial crops	1	0
Table potatoes	6	15
Industrial potatoes	36	31
Sugar beets	4	2
Fodder crops	4	4
Cattle density	15	32

Source: Data bank Rural History Group, WUR.

As the area under potatoes expanded and yields increased, production of starch (and their exports) grew correspondingly. Between 1860 and 1910 annual exports rose from 654 tonnes in 1860 to 117,370 tonnes in 1914.⁴⁰⁷



From the results of the agricultural census of 1921 it appears that in the Groningen *Veenkoloniën* the average size of a farm amounted to as much as 18.5 ha then. Of those who were full-time farmers 44% had 20 ha or more of land. In the Drenthe *Veenkoloniën* farms were a bit smaller, as the average farm size there was as high as 12.0 ha and 17% of the farmers had 20 ha or more.⁴⁰⁸

Since the *Veenkoloniën* farmers worked on a much easier, lighter type of soil than their colleagues in the marine clay districts in the north, they could manage with a smaller number of horses. Notwithstanding the fact that their size in hectares did not differ greatly from that in other arable farming districts, farmers in the Groningen *Veenkoloniën* had an average number of only 2.2 horses on their farms. In the northern marine clay district – on the other hand – this number was as high as 5.5 horses. In the latter district almost half of all farmers had 6 or more horses. In 1935 it was estimated that on an arable farm in the marine clay district a farmer should possess at least one horse per 6 ha of land; in the sandy districts this number was as high as one horse per 10 ha; in the livestock farming districts one horse per 10 to 20 ha and in the *Veenkoloniën* one horse per 10 to 15 ha of land.⁴⁰⁹

⁴⁰⁷ Pilat, 'Dutch agricultural export performance', 1989, Table C.1.D.

⁴⁰⁸ 'Het grondgebruik', 1923, pp. 48-49.

⁴⁰⁹ Minderhoud, 'De Nederlandsche landbouw', 1935, p. 206.

Part 3 – The period 1850-1950

During the 1920's, as more and more farmers specialised in potato cropping the *Veenkoloniën* farming system developed as one of the most industrialised farming systems in the Netherlands. However, at the same time it was one of the most vulnerable as well, because it specialised in producing only one product: potato starch. As the competition from starch from other – mostly tropical – areas increased and as the sales of potato starch decreased due to the fact that the textile industry itself went through a period of crisis, the potato starch industry – and consequently potato farmers – got into trouble. At the end of the 1920's strongly increased stocks of starch appeared to be virtual unsellable.⁴¹⁰ To help the destitute *Veenkoloniën* farmers the national government supplied the AVEBE with credits, so the organisation would be able to pay the farmers for the potatoes that had to be delivered to the factories.⁴¹¹

In time other measurements led to a considerable shrinkage of the area under potatoes (Figure 3.8). By 1932 the government fixed the maximum area under potatoes at 80% of that in 1929. Subsequently, in the years 1933-35 the area under potatoes had to be diminished

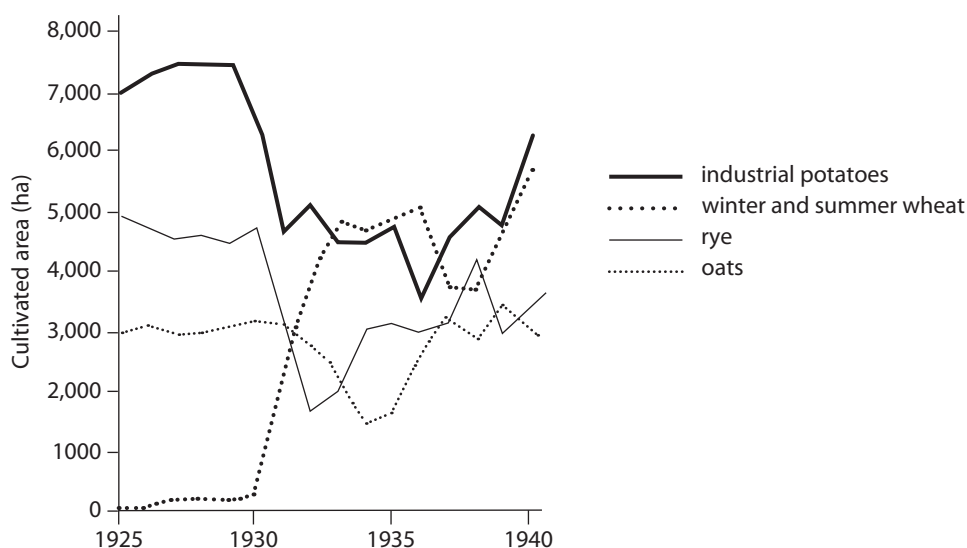


Figure 3.8. The area under industrial potatoes, wheat, rye and oats in the Veenkoloniën district in the province of Groningen in hectares, 1925-40.

After: 'Verslagen van de landbouw'.

⁴¹⁰ In the years 1923-27 the annual production of potato starch was as much as 1.26 million bags. In 1928 and 1929, however, production had risen to respectively 2.21 and 2.25 million bags, due to two exceptionally good harvests. 'Verslag van de landbouw' over 1930, p. 212.

⁴¹¹ Maliepaard, 'De Nederlandse landbouw', 1952, p. 17.

3.7. The Veenkoloniën – arable farming on former peat soils



Illustration 3.17. An early-20th century potato lifting machine.

In 1910 the Baas Brothers, technical engineers in Wildervank in the Veenkoloniën, came up with a machine that was supposed to bring an end to the search for a satisfactory potato lifter. Their machine was pulled by two horses, while the lifting construction was driven by a petrol engine; a novelty in those days. However, in practice the results were disappointing and the machine was never produced in great numbers. Source: Veenkoloniaal Museum, Veendam.

due to governmental restrictions to 65%, and in 1936 to only 42% of the ‘normal’ capacity. As a consequence, a large number of agricultural labourers had to be dismissed and a number of factories had to close down.⁴¹²

While in 1925 30 potato starch factories had been active, in 1939 there were only 21 (16 of them being a cooperative).⁴¹³ In an attempt to improve the profitability of the remaining factories managements started assiduously looking for a new application for starch. Soon, an increasing part of the starch was used to produce all kinds of derivatives, like dextrin, glucose, sago and glues. The latter would lead to the establishment of a derivatives industry in later years.⁴¹⁴

⁴¹² Keuning, ‘De landbouw’, 1951, p. 417; Steenberghe, ‘De landbouwcrisispolitiek’, 1939, p. 15; ‘Verslag van de landbouw’ over 1932, p. 10.

⁴¹³ ‘Verslag van de landbouw’ over 1925, p. 69 and over 1939, p. 212.

⁴¹⁴ Dendermonde, ‘Hoe wij het rooiden’, 1979.

The crisis measures taken by the government to help the clay-arable farming sector, in particular in the area of wheat cultivation, also had important consequences for farming in the *Veenkoloniën*, as they resulted in a considerable increase in the area of wheat, especially in the older colonies. For different reasons, however, wheat cultivation hardly paid here. As grain cropping became more and more prominent, rotations became imbalanced, and crops began to suffer from various kinds of diseases leading to falling yields. As a result, the outcomes of *Veenkoloniën* farming were ranked amongst the worst of all agricultural sectors during the Interbellum period.

In the early years of the Second World War farming in the *Veenkoloniën* of Groningen and Drenthe regained the form it had before the crisis, as the area of potatoes was expanded again very rapidly. In 1942 potatoes again took up about half of the sown area in the *Veenkoloniën*. However, a new problem arose in 1941 as, for the first time, the potato root eelworm (in Dutch the disease was called *aardappelmoëheid*, or potato sickness) appeared, causing rising losses to the crop from then on. It was caused by the fact that current crop rotation systems were much too close in time. In 1949 a proclaimed law to fight the disease ordered a 1:3 cultivation, i.e. on a single plot of arable land the cropping of potatoes was only allowed every third year. Beforehand a cropping rhythm of 1:2 had been commonly practised. The measure had far-reaching consequences for the *Veenkoloniën* farming system.⁴¹⁵

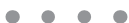


The post-war years in the *Veenkoloniën* were marked by attempts to solve the problem of a drastic reduction in the amount of labour that was needed in the potato culture. Already during the Interbellum period engineers had tried to construct machinery for harvesting potatoes mechanically. However, it was not until the mid-1950's that these attempts began to pay off. As far as the starch industry was concerned and due to increasing international competition, the AVEBE was obliged to look for new and extensive uses for starch, which led to the erection of a comprehensive derivatives industry.

⁴¹⁵ During the years of the German occupation legal measures had already been taken to tackle the problem; these were replaced by the above-mentioned law in 1949.

3.8. Horticulture

After the mid-17th century a stagnating – and in sometimes even declining – urban economy in the Netherlands led to a decrease in the sales of horticultural products. A process of de-urbanisation that occurred until well into the 19th century did not favour the sector. Yet, in a technical sense, a certain process of sophistication in demand took place: more ornamental plants and flowers and more kinds of finer vegetables, like asparagus, spinach, endive, lettuce, cauliflower, French beans, sugar peas, green peas, cucumber, etc. At the same time, ‘coarse’ vegetables like turnips, carrots, onions, garden beets and cabbage remained important products. This sophistication in the demand for vegetables and fruits was, of course, the result of an ongoing process of refinement of daily life itself, especially of the more well-to-do. The increase in potato consumption was, however, another factor, as the potato became a rather normal constituent of the daily diet of most people during the second half of the 18th century.⁴¹⁶ The first mentioning of potato cultivation in the northern Netherlands dates back to just before 1700 and soon afterwards it gained importance in some districts. As potatoes became ever more popular, they replaced, in fact, pulses and tuberous crops much more than daily bread. As such, the potato soon became a commercial crop, more so than in other parts of Europe at this time, where it was cultivated much more for home consumption. Shortly after 1715, the city of Leiden, for instance, had a specially established potato market.⁴¹⁷ The flower bulb trade, removed from all its extravagancies, remained a profitable business: small-scale and aimed at a small but wealthy group of public.



After 1850, horticulture profited most obviously from the opportunities export markets offered, in particular the British market. Important also, however, was the increase in sales in an – again – expanding home market, as incomes slowly rose during the second half of the 19th century. The opportunities this sector faced thereafter stimulated a process of intensification, differentiation and specialisation. Yet, at first, it was the increasing opportunities in the export trade that made Dutch horticulture grow, as the exports of vegetables (especially cabbage and early potatoes), fruits, bulbs and nursery stock were rapidly increasing. An important prerequisite for this orientation was the emergence of new and more efficient means of transport, like steam vessels and railways. Exports to Great Britain were stimulated in particular by the opening of regular ferry services between London and Rotterdam (later also Amsterdam). And in 1856, the Dutch railway system was connected with the German network. Horticulturists in the Langedijk district in Noord-Holland, for instance, profited from this when in 1865 the railway Den Helder-Amsterdam was constructed.

⁴¹⁶ Sangers, ‘De ontwikkeling’, 1952, pp. 158-159, 163-164; Sangers, ‘Structuur- en conjunctuurverschijnselen’, 1963, p. 107; Roessingh, ‘Landbouw in de Noordelijke Nederlanden’, 1979, p. 63.

⁴¹⁷ Endhoven *et al.*, ‘De tuin van Holland’, 1992, p. 23.

Part 3 – The period 1850-1950

Between 1846-50 and 1871-75 exports of horticultural products increased in value from 0.7 million to 5.8 million guilders, more than eight-fold (!). Around the mid-1920's, this amount had even risen to as much as 92.9 million guilders. At that time, horticultural products as a share of all agricultural exports had increased from 2%, around 1850, to 17%! (Figure 3.1).⁴¹⁸ As the sector grew, the number of people it employed also increased. The male labour force in horticulture increased from 11,300 in 1849 to 23,600 in 1889 and then to another 42,100 in 1909.⁴¹⁹ It is estimated that in 1947 the total number of male workers in horticulture amounted to as much as 88,000, or 17% of the total male workforce in the agricultural sector.⁴²⁰



At first, as with the exports of livestock products, exports of horticultural products were destined mainly for Great Britain. Already from 1830 grapes were exported there, and from 1850 onwards ever more market gardeners in the Westland district (south of the city of Den Haag) began to expand the cultivation of early potatoes to send them across the North Sea. In this district, risky fruit growing had to make way for an expanding potato culture. Yet, after 1870, competition problems in the British market rose, as Westland potatoes had to compete increasingly with potatoes from Southern France and the Channel Islands; consequently prices dropped. The latter was, however, also the result of all kinds of tampering with the intermediate trade – as also happened in the export trade of dairy products. In the trade of other horticultural products abuses also occurred and during the depression of the 1880's and 1890's this resulted to some extent in diminishing returns. Some time later, there were also warnings that as a result of all kinds of wrongdoings the export of onions might collapse as well. And indeed, exports of fresh vegetables did stagnate – or even decline – in the early 1880's. Yet, at that time, demand from the home market expanded, leading to an increase in prices again.

At the same time, bulb cultivation underwent unprecedented growth. The bulb trade had been an important aspect of the horticultural sector as early as the 17th century. From 1830 onwards a process of up-scaling occurred, as bulb growers capitalised on an increasing demand from Great Britain, particularly for hyacinths, the number one fashion flower of that time. After 1880, there was a rapid extension of this culture, especially in Zuid-Holland. New bulb centres emerged, particularly near the towns of Lisse and Hillegom, etc.. Exports of bulbs increased from 6 million kg in 1897 to 25 million kg in 1914 and then, notwithstanding governmental regulations and the struggle to cope with the ongoing crisis in the 1930's, rose to as much as 52 million kg in 1938.



⁴¹⁸ Pilat, 'Dutch agricultural export performance', 1989.

⁴¹⁹ These figures concern the male labour force above 15 years. Van Zanden, 'De economische ontwikkeling', 1985, p. 63, tabel 4.1.

⁴²⁰ CBS, 'Statistisch zakboek', 1954, p. 37; Perdok, 'Het aantal werknemers', 1968, pp. 41-42.

During the second half of the 19th century, as exports increased and the home market expanded, it became clear that the existing sales channels were no longer adequate. It is for that reason that horticulturists diligently looked for ways of improvement. And one way to solve these problems was to establish so-called despatch societies to make them less dependent on intermediate traders. The first ones of these *verzendingverenigingen* had already been established as early as about 1850. However, as prices stagnated between 1885 and 1895 these problems became more and more urgent, the number of these societies increased and a new type of institution appeared on the scene: the auction. The establishment of an auction in the village of Broek op Langedijk (in Noord-Holland) is generally considered to be the first cooperative auction for horticultural products in the Netherlands. In the Westland district, the first auction was established in 1890, in the village of Honselersdijk. At the end of the 19th century, there were 17 despatch societies in Noord-Holland, versus only 2 in Zuid-Holland; and 15 in joint horticultural districts elsewhere in the country.

In time auctions would outnumber the despatch societies, as the latter appeared to be less than entirely satisfactory in daily practice. The introduction of the auction clock was an innovation that made the actual selling procedure much more efficient. In 1902, the first electric auction clock was installed in the auction in Enkhuizen and it was soon copied elsewhere.⁴²¹

The extraordinary situation that emerged during World War I very much stimulated the auction system. Although flower cultivation, bulb growing and nursery stock businesses had to face great losses because of a fall in demand, the sales of vegetables abroad (Germany in particular) increased dramatically and the cultivation of coarse vegetables and potatoes was expanded significantly during these four years. Yet, in order to ensure the supply to the home market the government had to introduce regulations. Exports permits were only granted if horticulturists also supplied the auctions with a certain share of their produce to be sold on the domestic market and at reasonable prices. In practice, this regulation implied that they had to sell their entire produce through the auction, making the system virtually compulsory. The effect was an enormous expansion of this system that had proven to be a success even before the war. After the war, in most districts, horticulturists agreed to maintain the system, after it had become strictly compulsory in the 1930's as a part of the government's crisis regulations.⁴²² The joint turnover at these auctions increased from 6 million guilders in 1904 to 20 million in 1940.⁴²³



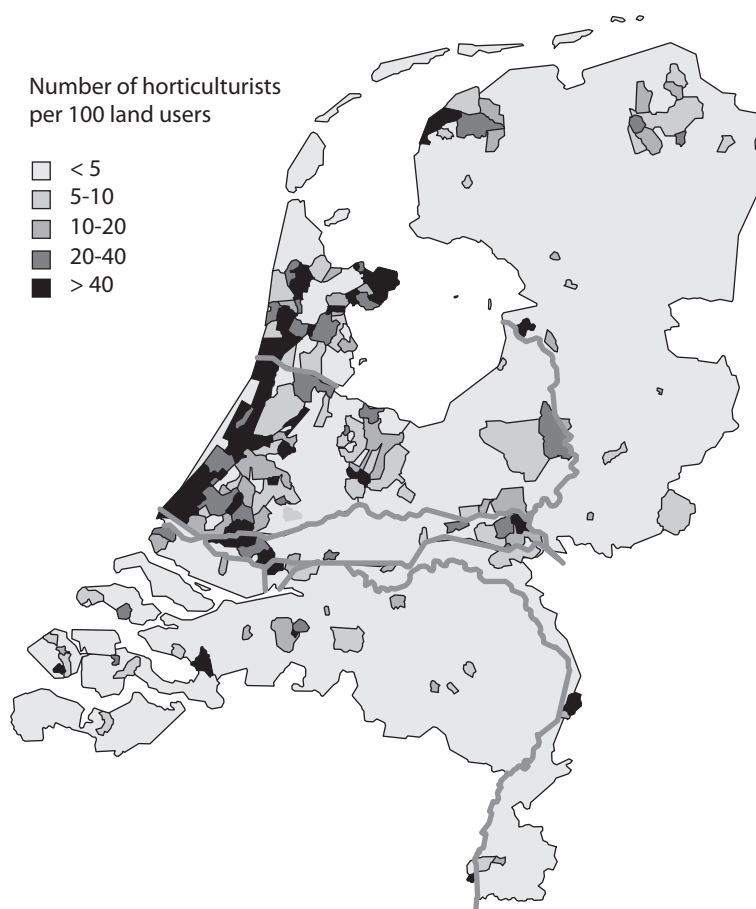
Horticulture was in fact pre-eminently small farming. The outcome of the agricultural census held in 1910 shows that a total number of 15,488 horticulturists together held 35,138

⁴²¹ Kemmers, 'De groente- en fruitveilingen tot 1945', 1987, p. 18.

⁴²² Bouman, 'De tuinbouw', 1951, pp. 435-436.

⁴²³ Sangers, 'De ontwikkeling', 1952, pp. 238-245; Van Zanden, 'De economische ontwikkeling', 1985, p. 311.

ha of land (Map 3.5). This implies that an average holding had only 2.27 ha of land.⁴²⁴ And as these holdings usually had no animals, manure had to be supplied from elsewhere. In the Westland area, for instance, horticulturists purchased large quantities of manure from a nearby cattle-fattening district. Initially also horse manure was especially suitable for use in hotbeds. However, as horse manure became ever more scarce (and expensive) Westland horticulturists in particular, changed over to pig manure and for this reason they began to keep pigs – sometimes quite a few – which they fed with the waste of their produce. Others



Map 3.5. The number of horticulturists per 100 land users (per municipality) in 1910
Horticulturists per 100 land users. After: 'Uitkomsten', 1912.

⁴²⁴ As a comparison: the category land users indicated as 'farmers' held an average of 11.7 ha of land. Uitkomsten, 1912.



Illustration 3.18. The cultivation of melons under Dutch lights (plat glas) (c. 1920).

Picture taken in the village of Honselersdijk in the Westland district. This method had become popular ever since the early 1880's. Water pumps like the one in the background were introduced shortly after World War I. Source: Westlands Museum, Honselersdijk.

kept on buying the manure they needed from external sources. However, in spite of the high costs they had to incur, horticulturists did not become leaders in the use of fertilisers; on the contrary, the use of fertilisers started rather late in the horticultural districts.

Typical of the intensive character of horticulture and the amount of investments that was made in the Westland district were the initiatives to suit extremely large areas of land for horticulture (early potato cultivation, in particular) which in fact were not initially suitable. To do so, from 1860 onwards, horticulturists began to cover these low lying clay soils with a layer of sand that was dug up and brought in by ship from the nearby dunes, usually during the winter season. Finally, by the 1930's, the area of these *opgevaaren* lands was several times larger than the initial garden area. In total an area of more than 1,000 ha was improved this way by about 5 million m³ of sand that was shipped in.⁴²⁵

Gardeners also invested large sums of money in the application of sheet glass, which enabled them to broaden the range of products and to 'force' (*forceren*) the growth of their crops, i.e. to advance and speed up the growth of their crops. As sheet glass was used, a distinction was made between so-called *plat glas* (flat glass; low glass) or Dutch lights, when this was used on hotbeds and *staand glas* (standing glass; high glass) or greenhouses. Until

⁴²⁵ Van Liere, 'De bodemgesteldheid', 1948, pp. 109-111; Schmal, 'Tuinbouw in het Westland', 1985.

the end of the 19th century, horticulturists almost exclusively used hot beds or *broeibakken* with Dutch lights; if necessary heated with the help of horse manure. The first *druivenserres* (grape houses) were introduced following the Belgian example in the Westland district, in 1890. The characteristic Westland greenhouses were built for the first time in 1903, in the village of Loosduinen near Den Haag. In other horticultural districts as well, glasshouses appeared from that moment on. However, it was the Westland grape cultivation that really gave the first impetus to the use of glass and just before World War II almost 800 ha of grapes under glass were grown in the Westland district.⁴²⁶ Though, another important incentive came from the auctions which, for instance, stimulated significant improvements in the packing material for this fragile product.



Shortly after the introduction of the greenhouses they were used to force vegetables as well. In the course of the 1890's, heating was also introduced. This allowed for not only higher productivity but made cultivation much more secure. Now several crops could be grown for a much longer period of the year.

In 1912 584 ha of gardens were glass covered, most of it (81%) with Dutch lights. From that moment on, however, the area covered with greenhouses increased rapidly (Table 3.19).

In 1940, almost all of the 2,269 ha of greenhouses, was used for vegetable cultivation, although flower cultivation had already expanded rapidly in the course of the 1930's. In Aalsmeer (near Amsterdam), in particular, rose culture had spread out from 1929 onwards. In 1934, there was already an area of 60 ha covered with rose glasshouses, which produced more than 60 million roses each year. In those days, the first cut flowers were exported by aeroplane to foreign countries.

Table 3.19. The area of Dutch lights (plat glas) and greenhouses (staand glas) in 1912, 1927, 1940 and 1950, in hectares.

	1912		1927		1940		1950	
	ha	index	ha	index	ha	index	ha	index
Dutch lights	477	100	833	175	985	206	921	193
Greenhouses	107	100	611	571	2,269	2,120	2,330	2,178
Total	584	100	1,444	247	3,254	557	3,251	557

Source: Sangers, 'De ontwikkeling', 1952, p. 234 (1912 and 1927); Minderhoud, 'De Nederlandse landbouw', 1952, p. 76 (1940 and 1950).

⁴²⁶ Van der Slikke, 'De fruitteelt onder glas', (1948).

Another method to try to exploit the higher off-season prices was to store vegetables – those that were suitable – for as long as possible into the winter season. For this reason gardeners in the ‘cabbage district’ of Noord-Holland, de Langedijk, began to build special insulated *koolschuren* (cabbage sheds). These enabled cabbage growers to keep their cabbage fresh way into the wintertime and sell them little by little. By the end of the 19th century, for the same reason, entrepreneurs began to produce sauerkraut for which a special variety of Danish white cabbage was introduced. Soon, the cultivation of this sort of cabbage spread out.



In the 1920’s several parts of the horticultural sector expanded substantially, not only in the traditional centres but also outside these and a number of new centres emerged. In addition, horticulture became more (capital) intensive, partly due to a clear tendency to increase the area of heated greenhouses. Especially striking was the increase in tomato cultivation. Not mentioned separately in the pre-War exports statistics, exports of tomatoes in terms of money rose to as much as 19 million guilders in 1930; i.e. 36% of the total value of exported vegetables. When horticulturists found out that the cultivation of *stooktomaten*, or ‘hothouse tomatoes’ was even more profitable than that of ‘coldhouse’ tomatoes, many greenhouses were transformed and equipped with a heating installation. By 1927, 17% of the total area of greenhouses in Zuid-Holland were heated. In the early 1950’s, since the number of exported tomatoes had increased to one third of the total of exported vegetables, more than half of all these tomatoes were cultivated in hothouses.

Before World War I, horticulturists had managed to offer consumers an ever broader range of vegetables and fruits, flowers, nursery stock and bulbs. Yet, the most important sectors were vegetable gardening and fruit growing; both together took 41% of the total area under horticulture, in 1928, with bulb growing claiming another 11%.⁴²⁷ Expressed in money they produced well over two thirds of all what was produced in Dutch horticulture (Table 3.20). It was estimated that almost three quarters of the sector’s total production was exported (Figure 3.9).⁴²⁸

In 1928 the export situation changed quite dramatically. As the amount of exported vegetables and fruits increased, their value fell. As for the livestock sector (i.e. dairy products and pork) the devaluation of the British pound had important consequences for horticulture as well. For some products, like cabbage and tomatoes, prices fell to a fraction of what they had been before. The government tried to help the sector, setting up price regulations and compulsory auctioning. When a certain, recommended price was not reached at these auctions, horticulturists received a surcharge paid by the government. There were also fixed minimum prices – usually below cost price – and if products did not fetch these minimum prices, they were withdrawn from auctioning and remained unsold. In practice, it meant that they were then destroyed. To prevent an uncontrolled expansion in production, limiting

⁴²⁷ Minderhoud, ‘De Nederlandse landbouw’, 1952, p. 75.

⁴²⁸ Minderhoud, ‘De Nederlandsche landbouw’, 1935, p. 108.

Part 3 – The period 1850-1950

Table 3.20. The estimated production value in million guilders in the distinguished sectors in horticulture in 1912, 1928 and 1930.

	1912		1928		1930	
	x 10 ⁶ gld	in %	x 10 ⁶ gld	in %	x 10 ⁶ gld	in %
Vegetables	25	45	120	54	93	48
Fruits	8	14	30	14	23	12
Bulbs	15	27	47	21	51	26
Nursery stock and flower crops	6	11	18	9	21	11
Vegetable & flower seed	2?	3	5	2	5	3
Total	56	100	220	100	193	100

Source: Minderhoud, 'De Nederlandsche landbouw', 1935, p. 111.

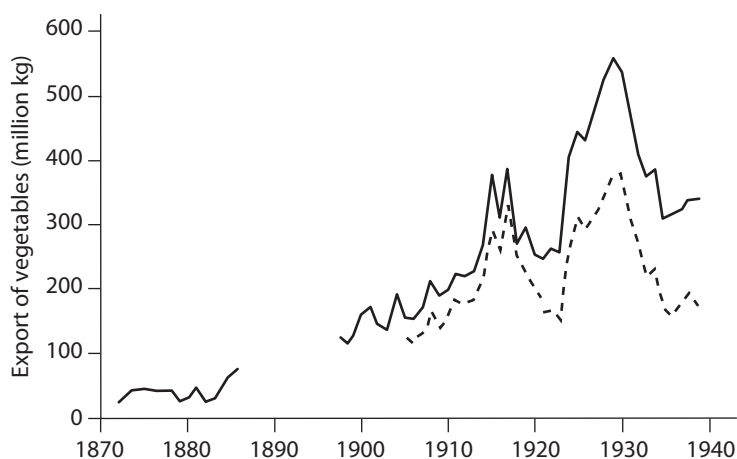


Figure 3.9. Exports of fresh and preserved vegetables in million kilograms, 1872-1939.

Solid line: fresh and preserved vegetables, incl. onions and excl. potatoes (gross weight). Broken line: fresh vegetables, excl. onions and potatoes (before 1921 gross weight; after 1921 net weight). After: Sangers, 'Structuur- en conjunctuurverschijnselen', 1963, p. 135, Figure. 21.

regulations were introduced and applied progressively to larger holdings. For small holdings there were virtually no limitations. In flower bulb culture, a period of proliferation was followed by a period of reorganisation. The area under bulbs was reduced from 10,000 ha to 7,000 ha in 1933.

The Second World War brought a high increase in prices, which required the government to establish maximum prices. Vegetable growing and fruit growing were expanded, while flower and bulb growing had to be reduced. In the last year of the war in particular fuel shortages, inundations, evacuations and the destruction of glass caused enormous damage and disorder.

Part 4 – The period 1950-2000
Farming becomes agri-business

4.1. Introduction

The first years after the war were a period of recovery for the agricultural sector as well. In the course of the year 1946 all the farmland that had been inundated in the last year of the war had been drained again. In 1949 grain cropping was released from the regulations set up during the war years to ensure sufficient domestic production of food crops. A year later, in 1950, the sale of artificial fertilisers was released and soon the quantities being used increased again. The build-up of the livestock population, however, was of great concern, especially in the case of pig and poultry stocks. And around 1950 the problem, of course, was still the shortage of currency and therefore of feed; the rationing of animal feed was not abolished until 1953. However, exports of products from the horticultural sector and of seed potatoes in particular, were taken up again almost immediately after the hostilities had ceased.

Initially the early 1950's, in many ways, promised to be a continuation of what had happened before the war. This was particularly so in the area of government policy towards small mixed farming in the sandy provinces. Almost two thirds of all holdings with 10 ha or less land were to be found there. The government policy towards this large group of industrious workers still consisted of coaching and the rationalisation and improvement of their current farming practice. The role of the State extension service, for instance, was extended and the number of employees rose from a little less than 500 to more than 1,500 by the mid-1950's.⁴²⁹ And although many experts (including the farmers' associations) recognised that the large number of small farms were 'the weakest spot in the agricultural sector' no one drew any conclusions from it at that time.

Yet, in the background a change had set in. In 1960 a governmental research commission called for scale enlargement by means of farm enlargement and for pushing back the 'labour' factor by means of mechanisation. Earlier, in 1951, economists had already concluded that about 20% of the workforce on these small mixed farms had to be considered as a potential labour surplus, standing in the way of a sound tension between supply and demand of labour. The connected problem of too low a level of labour productivity set the pace for what would happen in the coming decades.⁴³⁰ This problem, in the 1930's already described as the 'smallholders' problem', was in fact the legacy of the success of small farming in the decennia around 1900, on the basis of many and multifarious forms of cooperative organisations and a supportive governmental policy.

The low level of labour productivity was indeed felt most acutely on the small farms in the sandy regions, yet it was not restricted to only there. After all, from 1927 onwards it was already apparent that in the whole Dutch agricultural sector the level of income of farmers lay below the income land labourers earned. And this in fact set the tone for the transformation the sector would go through after 1950, but even more so after 1960.



⁴²⁹ Zuurbier, 'De besturing', 1984, pp. 85-88.

⁴³⁰ Maris, 'Het Kleine-boerenvraagstuk', 1951.

The scene would indeed soon be changing. During the 1950's, but even more so after the early 1960's, the economy began to grow as part of the upsurge of the post-war Kondratieff wave. As a consequence the general wage level increased rapidly, as did that in agriculture, which meant that farmers' wage costs were increasing just as rapidly. Yet, in the long term the price of their products, whether this was milk or wheat, hardly rose. As a consequence and in terms of their own income farmers had to produce ever more if they wanted to maintain it at a level that had meanwhile become common in the other sectors of the economy. Eventually, by the late 1980's the price index of wheat, for instance, had gone up by about 190 points, while labour rose by more than 2,500 points; milk prices increased by 360 (Figure 4.1).⁴³¹ In the early 1950's a farmer got 12 to 15 cents for one egg; 30 years later this was even less. In addition, the price of land compared with that of modern inputs like concentrates and fertilisers followed a similar trend to that of the price of labour.

Before the war the 'technical regime' in Dutch agriculture was marked by an increase in the use of several kinds of 'land-saving technologies', like fertilisers and concentrates. Now however, after 1950, the search for new 'labour-saving technologies' became important. The 'labour' factor was to be reduced drastically and it had to give way to 'capital'. Consequently investments in agriculture increased rapidly, especially after 1963.⁴³²

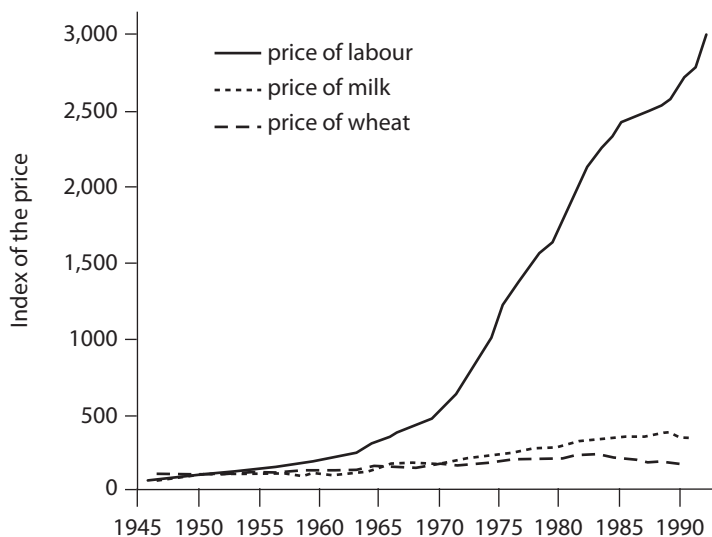


Figure 4.1. Index of the price of labour and the prices of milk and wheat, 1945-1992.
Index: 1950=100. After: LEI/CBS, 'Landbouwcijfers'.

⁴³¹ LEI/CBS, 'Landbouwcijfers'.

⁴³² Bieleman, 'De landbouw en het sociaal-economisch krachtenveld', 2000.

Government policy towards agriculture and agro-scientific research were now aimed especially at an increase in production per unit of labour, i.e. at an increase in labour productivity. Efforts to obtain higher production per hectare or per cow, of course, remained a decisive element in the race that began now. And all this formed the ingredients of an unprecedented, complex and comprehensive process of mechanisation, intensification, specialisation, rationalisation and up-scaling.

For outsiders, the process of *mechanisation* was probably most noticeable in the replacement of the farmers' workhorse by a tractor.⁴³³ Before the war, the number of tractors in Dutch agriculture had been small. Dutch farms in general were too small and tractors much too expensive. A breakthrough came after the war, stimulated also by the opportunities that the Marshall funds provided. In 1950 18,000 tractors had already been registered and their number had increased to 64,000 in 1960, 135,000 in 1970, and finally 196,000 in 1990. In the same period the number of horses decreased from 230,000 in 1947 to hardly more than 50,000 in 1970. The two trends overlapped in 1965 (Figure 4.2). Seen in terms of horse power, however, the total draught power of all Dutch tractors already surpassed that of the joint horse stock by 1959.

The most important innovation in dairy farming in the 20th century was, without doubt, the introduction and spread of the milking machine. The first (imported) models had already been introduced into the Netherlands before the First World War and in the 1920's a small growth in numbers occurred. In the 1950's the number of machines increased. Between 1950 and 1960 their numbers grew tenfold from 4,000 to 39,000. During the following decade growth slowed down somewhat, but was still phenomenal, rising to a number of 85,000 in 1970.

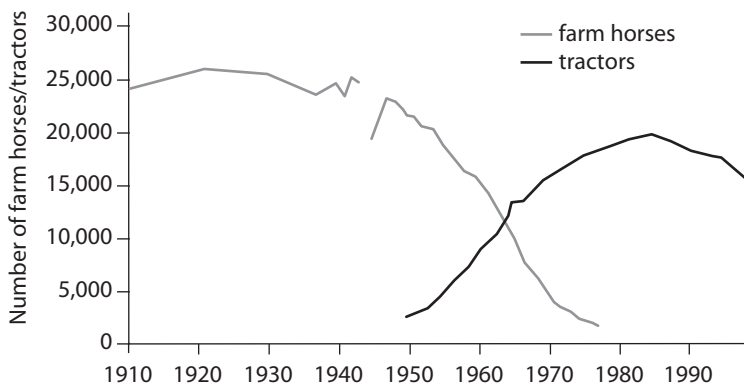


Figure 4.2. The number of farm horses (>3 years) and tractors in the Netherlands, 1910-99.

After: 'Verslagen van de landbouw'; LEI/CBS, 'Landbouwcijfers'.

⁴³³ Priester, 'Paarden en trekkers', 2000.

One of the most appealing forms of mechanisation in arable farming was, of course, the spread of the combine harvester. Before the war, even progressive extension officers believed that there would be room for no more than 3 even if the new large-scale IJsselmeer polders were included. However, once these machines were adapted to the situation here (small fields, heavy crops and moist weather conditions) their numbers increased rapidly. In 1950 there were already 1,200 and in 1965 three quarters of the area under grain were harvested with a combine; there were 5,600 of them at that time.⁴³⁴

Intensification, in particular, became – amongst many other things – visible in the ever-growing quantities of fertilisers, i.e. nitrogen, that were applied. In the early 1950's, the annual total use had amounted to less than 160 million tonnes, and by the mid-1980's this had increased to 500 million tonnes (Figure 4.3). At the same time the amount of concentrates that was fed to the livestock increased from an annual quantity of 800 kg per cow in the 1950's to more than 2,200 kg in the late 1970's.⁴³⁵ During the same period the quantities of chemical compounds used for crop protection increased rapidly: insecticides against insects, fungicides against phytophthora in potato cropping and herbicides to reduce the last amount of labour in the battle against weeds.⁴³⁶ In the mid-1980's arable farming was by far the biggest consumer, followed at some distance by the flower bulb culture (Figure 4.4).

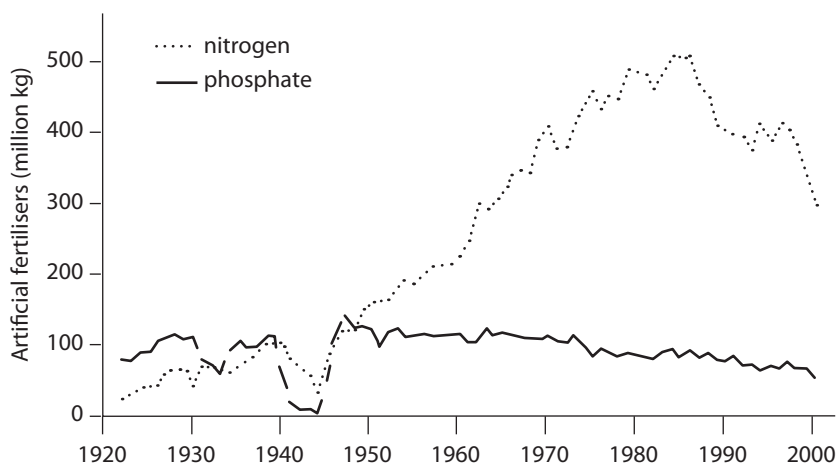


Figure 4.3. The consumption of artificial fertilisers (nitrogen and phosphate) in million kilograms, 1922-2000.

After: Ragondet, 'Studie over de ontwikkeling', 1952; LEI/CBS, 'Landbouwcijfers'.

⁴³⁴ Priester, 'Het akkerbouwbedrijf', 2000, p. 87-90. LEI/CBS, 'Landbouwcijfers'.

⁴³⁵ These figures concern the sandy districts. LEI/CBS, 'Landbouwcijfers'.

⁴³⁶ Bieleman, 'Gewasbescherming', 2000.

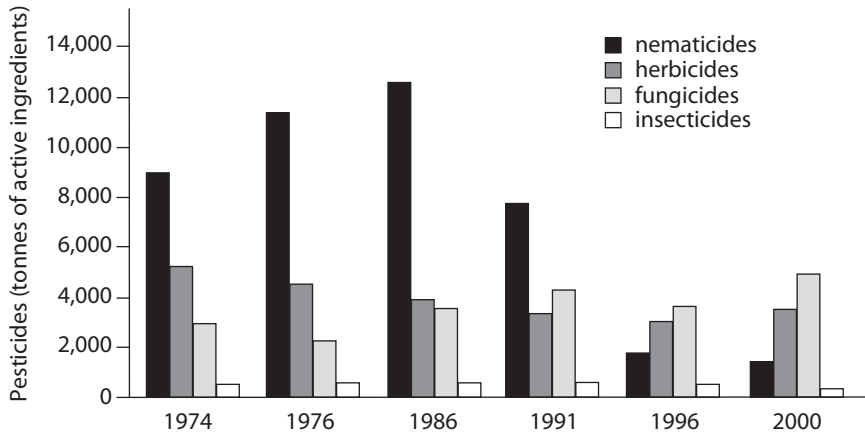


Figure 4.4. The consumption of pesticides in tonnes (active ingredients) in the Netherlands, 1974-2000. After: Oskam et al., 'Pesticide use', 1992, p. 10, Table 2.4; LEI/CBS, 'Landbouwcijfers'.

Before the war most Dutch farms had been mixed farms, producing a number of different products. Although there were specialized dairy farmers and specialised arable farmers and horticulturists, their numbers were small. After the 1950's, however, most of these holdings *specialised* in one or two products. In the sandy regions, in particular, the traditional 19th century mixed farm, where arable production served the livestock (Dutch agronomists then used the term *étagebedrijf* – literally: storey farm producing milk [butter], pork and eggs), ceased to be and became instead a specialized dairy farm, pig fattener or poultry keeper.

In terms of *rationalisation* and *up-scaling* the activities of government institutions in the field of land consolidation must be mentioned. In 1958 a *Meerjarenplan voor ruilverkaveling* (long-term programme for land consolidation) was published, a plan that was explicitly aiming at farm enlargement. The then Minister of Agriculture believed that scale enlargement was an important instrument for increasing labour productivity, without boosting total production too much. After this long-term programme was introduced, projects together holding more than 50,000 ha were started annually, over a period of more than a decade (Figure 4.5). As a result, much of the traditional and familiar rural landscape was changed drastically or even wiped out completely, to make way for much more functional types of landscape. With the help of substantial subsidies from the government, the countryside's infrastructure was improved significantly. Accessibility was improved, farms were replaced and the size and shape of individual plots of land were adapted to what was required for mechanised farming.⁴³⁷

The *Meerjarenplan* however did not yet demonstrate any attention to 'nature', 'scenery' or 'recreation'. It was not until the release of a so-called *Relatienota* (Relation memorandum) in 1975 that authorities recognised the importance of these concepts as a part of an integral

⁴³⁷ Bieleman, 'De cultuurtechnische verbouwing van Nederland', 2000.

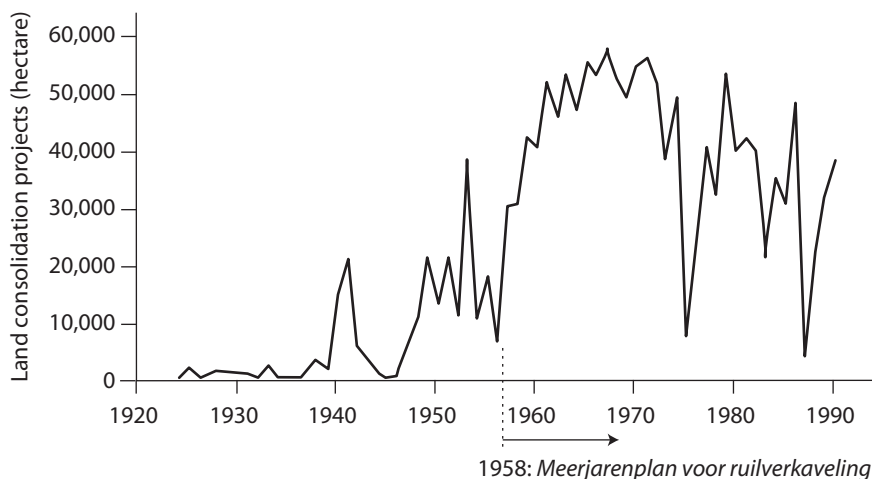


Figure 4.5. The area of annual implemented land consolidation projects, in hectares¹, 1924-90.

After: Bieleman, 'De cultuurtechnische verbouwing', 2000, p. 54 Graph 4.1.

¹ Not including re-consolidation projects and land reconstruction projects based on special legislation.

rural planning policy. In 1985 the old Land Consolidation Act of 1954 was replaced by a Land Reconstruction Act (*Landinrichtingswet*), that paid more attention to nature and scenery.

Between 1924 (the year the first Land Consolidation Act came into effect) and the end of 1985 452 land consolidation projects had been finished, covering an area of almost 1,5 million hectares. For another 448,630 ha of land a land consolidation scheme was requested. Given the fact that the area of farming land in the Netherlands covered about 2 million hectares a much greater part of it had been drastically reconstructed.

New also was a Rural Area Development Program (*Streekverbetering*).⁴³⁸ It marked a new phase in the development of agricultural extension. The overall aim of the program was 'to speed up agricultural developments in rural areas where populations suffered from a relatively large backlog as a means to improve rural welfare and income'. Typical was the broadening of the agricultural information to the domain of the whole farmer's family, which was based on the idea that the great majority of Dutch farms were family farms. After 1969 activities in this field were slowly run down.

The government also actively supported what was going on in the agricultural sector in other ways. An important step within the framework of its structural policy, with the primary aim of tackling the deteriorating conditions on the small mixed farms in the sandy districts, was the introduction of an *Ontwikkelings- en Saneringsfonds voor de Landbouw – o&s-fonds* for short – a development and reconstruction fund for agriculture, in the spring

⁴³⁸ Karel, 'De maakbare boer', 2005.



Illustration 4.1. A meeting within the framework of a land consolidation project.

From the late 1950's onwards very large areas of farming land were changed drastically within the framework of land consolidation projects (ruilverkavelingen). With the help of large government subsidies parcellation, road systems, drainage systems were taken up to be adapted to the demands of a rapidly mechanising and rationalising agricultural sector. Land consolidation projects include very complex procedures in which many interests are involved; not only in financial but also in emotional terms. The photo shows a meeting in the Alblasserwaard (in the province of Zuid-Holland, east of Rotterdam), in 1965. The project included 20,500 ha of farming land. To the left, behind the desk, the expert engineers; below the farmers, landowners, and other stakeholders. Source: Stichting Historie der Techniek, Eindhoven.

of 1963.⁴³⁹ In the short term the regulation was designed to relieve the acute financial problems on these small farms caused by economic problems in the dairy and poultry sectors, after the introduction of the Common Market. In the long term, however, the O&S-fund was meant in particular to improve the internal farm structure of viable farms, and to encourage others that were not viable, to be sold. The land of the latter would then be used to benefit the former. Later on, the O&S-fund also supported the increased spread of technical innovations.

In fact, the government policy to stimulate the above-mentioned processes of mechanisation, intensification, specialisation, rationalisation and up-scaling in the form

⁴³⁹ Van den Brink, 'Structuur in beweging', 1990.

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of its *structuurpolitiek* as well as its price policy did not stand alone. It was based on the then ruling paradigm that a well-functioning agricultural sector formed a requisite for a sound, agriculture-based country culture, which in itself was seen as an important stabilising element of Dutch society as a whole.



The process of up-scaling not only occurred in primary production itself, i.e. on the farms, but also in the processing industry and in the organisational infrastructure. For instance, during the mid-1950's the potato starch industry in the *Veenkoloniën* had consisted of about twenty plants (15 of them were cooperatives); in the 1990's production was concentrated in only three locations.

In dairy farming, the widespread use of the milk cooling tank and the milk collection tanker stimulated and facilitated a process of restructuring within the dairy industry after 1963. By the 1970's many small creameries had ceased to exist, as milk processing became concentrated in only a handful of larger ones. As in the processing industry technical developments in the field of cattle breeding also forced the adoption of a more efficient organisational structure. And as part of a broad process of rationalisation, the Dutch Herdbook Society merged with the Central Milk Recording Service and four other organisations in the field of organised cattle improvement. Together with the Friesian Herdbook Organisation they formed *Het Nederlands Rundvee Syndicaat* (the Dutch Cattle Syndicate – the acronym 'NRS' could be kept alive) in 1984, soon to be joined by the FRS. The AI cooperatives, however, remained independent for the time being, but in 1998 they joined this organisation too as CR-Delta was established: the *Coöperatieve Rundveeverbetering Delta* (Cooperative Cattle Improvement Delta).⁴⁴⁰

Elsewhere, in the institutional sphere, important shifts were also occurring. Of old, in the field of representation of interests three farmers' societies (*standsorganisaties*) had been operating (the three 'CLO's'), while three land labourer organisations had taken care of the interests of these workers in the agricultural and horticultural sector. However, when the German occupying authorities tried to Nazify them, they all went underground while keeping in touch. Shortly after the war the *standsorganisaties* (employers) and the farms workers' unions (employees) got together again and formed the *Stichting van de landbouw* (the Advisory Council). This Council acquired a statutory basis in 1954 when it was converted to the Agricultural Board, *het Landbouwschap*. Every farmer and every land labourer was considered as a member and *het Schap*, as it was called for short, obtained the authority to promulgate legal measurements that concerned the whole sector. As a result, it offered the farmers' and workers' organisations legal instruments to keep regulatory measures in their own hands and as such it played a central role in the corporative agrarian economy of those days. Although it never became very popular amongst farmers (partly due to its compulsory membership), the *Landbouwschap* developed into a powerful farmers' bulwark. Yet, from the mid-1970's onwards it lost its credibility as young farmers and

⁴⁴⁰ Bieleman, 'De georganiseerde rundveeverbetering', 2000.

horticulturists no longer wanted this rather paternalistic, conflict-avoiding strategy, and, finally in 2001 it was abolished.⁴⁴¹ Meanwhile, in 1995, the three CLO's had joined together to form a new organisation: *Land- en Tuinbouworganisatie Nederland* (LTO-Nederland).



In regard to the spectacular, technical developments that occurred after 1950, publicists usually attribute an important role to the concern of the national authorities in the form of the activities of the so-called OVO-tryptich⁴⁴², the informal interweaving of agricultural research, information and education, quasi directed by the Ministry of Agriculture in Den Haag. Much less attention has been paid, however, to the active role private enterprise played, as by now it did much more than just processing and marketing primary agricultural products. Private enterprise had become an important innovator and supplier of knowledge, machinery, housing systems and basic materials.

The activities of the authorities in the framework of its structural policy towards the sector as well as the innovating role of private enterprises were setting the scene, might easily give the impression that farmers and horticulturists themselves were simply passive 'technology takers', and that their contribution to the process of innovation was negligible. However, the daily practice was different and in reality it appeared that farmers and horticulturists were in truth always looking for innovative ways to remove bottlenecks in their farming practice. Experts in the field of potato cultivation, for instance, claim that at least half of all innovations in this sector were designed by farmers themselves. The role of the advisory officers had to be seen in the way these functionaries picked up the innovative ideas and spread them around.⁴⁴³ Innovations like the pre-wilting method of silage making, green maize as roughage, the cyclomower and AI were all very typically innovations that found their way from the bottom up.

Characteristic in this sense were also the study clubs that were established, for instance, amongst arable farmers to compare mutual methods and strategies in wheat cultivation. They discussed their choices of varieties, the use of fertilisers and pesticides in relation to their financial results.

Comparable to some extent to these study clubs were all kinds of forms of self-organisation, established by groups of farmers as an answer to the ever more complex legislation from the authorities to cope with the manure surplus and measures that were taken in the field of nature and landscape conservation. They called themselves environmental cooperatives (*milieucoöperaties*), analogous to the many different forms of cooperative entrepreneurship

⁴⁴¹ Krajenbrink, 'Het Landbouwschap', 2005.

⁴⁴² The acronym OVO stands for *Onderzoek* (research), *Voorlichting* (information, extension) and *Onderwijs* (education).

⁴⁴³ Van der Ploeg, 'De verwetenschappelijking van de landbouwbeoefening', 1987, p. 6. Van der Ploeg based his statement on a verbal communication by Dr. D.A. van der Zaag, a leading expert in the field of potato breeding in the Netherlands. See also: Van der Zaag, 'Die gewone aardappel', 1999.

that came about at the end of the 19th century as the farmers' answer to what economists call the 'imperfection of the market'.⁴⁴⁴



In the first decades after the war Dutch agricultural policy was chiefly characterised by three aims.⁴⁴⁵ In the first place an adequate food supply at low consumer prices. Secondly, exports had to be increased by stimulating production increases to obtain a positive balance of payments and, thirdly, a reasonable standard of living had to be guaranteed for those who earned their living in the agricultural sector. This policy acquired new and European dimensions when, on 1 January 1958, the Treaty of Rome came into effect, founding the European Economic Community. The treaty implied that a common agricultural policy was essential for the functioning of a future common market. During the first years, the agenda was dominated by attempts to arrive at a common market and price policy.⁴⁴⁶ A free trade regime of agricultural products between the member states, in particular, was seen as one of the basic elements of the common policy – for the time being.

It was not until 1968 that a first move was made to establish a structural policy for the agricultural sector on a European scale. The outlines of this policy were laid down in what became known as the 'Mansholt plan', after the then agricultural commissioner Sicco Mansholt (1908-1995; from 1945 until 1958 Minister of Agriculture in the Netherlands, when he became commissioner).⁴⁴⁷ One of the main elements was to stimulate the modernisation of farms; a selective policy to encourage farms with sound future perspectives. At the same time the Mansholt plan aimed at stimulating farm business termination of the smaller farms in order to leave the released land for the benefit of the sound and viable ones. According to Mansholt's ideas then, five of the ten million European farmers would have had to quit by 1980. The motives behind his ideas were the increasing agricultural surpluses and the associated budgetary problems and the impossibility of adequately realising the income aims for farmers. The shock therapy that he was proposing, however, did not have the desired effect and farmers all over Europe turned against him en masse.

Yet nationally, the government had as good as accepted this surplus problem when it deliberately opted for a policy to stimulate an increase in productivity and production. It was seen as a way to maintain the farmers' income as well as consolidate the economic position of the sector. And for the same reason it focused purposefully on the competition with other EC member states, following the second half of the 1970's.

Consequently during the 1970's the problem of production surpluses just got worse and worse, not only in arable farming but in dairy farming as well and not only in the Netherlands but also in other European countries. To control the rapidly expanding milk lake and butter

⁴⁴⁴ The first ones were established in the eastern, sandy parts of the province of Friesland, in 1992. Stuiver and Wiskerke, 'The VEL and VANLA environmental cooperatives', 2004.

⁴⁴⁵ Wiskerke, 'Zeeuwse akkerbouw', 1997, pp. 40-48.

⁴⁴⁶ Heringa, 'De totstandbrenging', 1994; see also: Wiskerke, 'Zeeuwse akkerbouw', 1997, p. 42.

⁴⁴⁷ Vermeulen, 'Europees landbouwbeleid in de maak', 1989.



Illustration 4.2. Sicco Mansholt visiting a farm.

Sicco Leendert Mansholt (1908-1995) is considered to be the architect of an agricultural policy that acquired European dimensions. His ideas about the future structure of European agriculture caused a lot of unrest amongst farmers as these were launched at a time when a huge process of change had already begun. On this photo from 1950, he – once an arable farmer himself – is visiting an arable farm in one of the new polders as Minister of Agriculture, Fisheries and Food supply. Source: Photo: Sem Presser. MAI Amsterdam.

mountain the European Commission proposed a plan to regulate milk production in the EC by establishing a levy on milk in excess of a certain threshold. The regulations came into force in 1984 and for Dutch dairy farmers the threshold – the ‘quota’ – after which penalties had to be paid, was tied to their production level in the years 1981-83.⁴⁴⁸

As the 1980’s progressed, the problem in the arable farming sector also worsened. Price reduction as a remedy for curbing production did not work and consequently in a European context plans were made for a far-reaching reformation. This finally led to the so-called

⁴⁴⁸ Bieleman, ‘Technological innovation’, 2005, pp. 246-247.

MacSharry reforms in 1992, named after the then Irish agricultural commissioner Ray MacSharry. Until then arable farmers had received too a high price for their wheat in relation to the world market price and MacSharry's ideas were to constitute a drastic reduction. Consequently the European Common Agricultural Policy (or CAP) explicitly acquired worldwide dimensions. Because it was not only dictated by the urgent need to curb the surpluses and bring order to the internal European market, but in fact also – and in particular – as part of the worldwide negotiations within the framework of the GATT, the General Agreement on Tariffs and Trade.⁴⁴⁹

Thus, after 1950, the Dutch agriculture sector developed into one of the most productive in Europe. The increase in productivity not only occurred in new sectors, like greenhouse horticulture and intensive livestock farming (pig and poultry keeping). In the more traditional forms of agriculture, like arable farming and dairying there was also an increase in productivity, i.e. especially labour productivity, which was higher than in most other European countries. Earlier differences in labour productivity between the Netherlands and typical exporting countries like Australia, Canada and the United States had virtually disappeared by the mid-1980's.⁴⁵⁰

Subsequently, and especially after the early 1960s, a period of virtually undisturbed economic expansion occurred. This expansion was to a large extent the result of opportunities offered by the European Common Market. The Dutch succeeded in increasing their agricultural exports to the Common Market countries, managing to keep ahead of their most important competitors, the Danes, who were still locked out of the Common Market. Not all sectors, however, profited to the same extent. For instance, poultry keeping suffered terribly after the Common Market had been established in 1962, as a transitional arrangement for this sector in particular appeared to work out badly for the farmers of the mixed farming systems on the sandy soils. It was not until 1967 that this situation improved.



Throughout the 1950's, the years of reconstruction, agricultural developments geared to growth and increased productivity experienced no social opposition. On the contrary. The rapidly expanding sector, applying all kinds of new technology, was in perfect harmony with the then fast developing economy. However, the success story that was often held up as an example for developments elsewhere, began to show its other side more and more in the course of the 1970's. Ever more questions were raised about the intensive methods of production, the claim on scarce raw materials and space, as well as the quality of the agricultural products themselves. More and more criticism was heard and little by little sectors lost the prestige that they had formerly enjoyed and always taken for granted.

For the general public it was Rachel Carson's book *Silent spring*, published in 1962⁴⁵¹, that stimulated opinions on the matter of modern agricultural developments in relation to

⁴⁴⁹ Wiskerke, 'Zeeuwse akkerbouw', 1997, pp. 47ff.

⁴⁵⁰ Van der Meer, 'De Europese Gemeenschap', 1990.

⁴⁵¹ A Dutch edition was published a year later.

the environment. Partially as a result of her book, the authorities came up with measures that introduced drastic restrictions on the use of a large number of insecticides, like DDT and related substances. In 1972 these chemicals were banned completely and the use of mercury-based fungicides was also radically curbed.

In spite of an increasing number of government instructions and all kinds of developments in the field of biological and integrated control of plant diseases, in the mid-1980's Dutch agriculture was paradoxically one of the biggest users of pesticides. For a long time, however, the government refrained from actively pursuing any policy to curb the rapidly increasing use of them, except for the measurements mentioned above. In 1984 a *Nota Gewasbescherming* (Memorandum on crop protection) was released, to remain, however, largely a dead letter. It was not until the end of the 1980's that things started moving and in 1991 the government proposed the *Meerjarenplan Gewasbescherming* (long-term programme for crop protection) that was meant to be a task-setting program for crop protection in Dutch agriculture and horticulture. The idea was to achieve a decrease in the structural dependency of chemical compounds and a substantial reduction in the use of them.⁴⁵²

In these years, the mid-1980's, farmers were also confronted with a complex of legal regulations concerning the increasing manure surplus problem which forced them to make large investments.⁴⁵³ At the same time, the increasingly critical attitude of many consumers towards the quality of the products and the circumstances under which they were produced stimulated the introduction of all kinds of eco-products and eco-methods: biological crop protection in horticulture, free range hens in poultry keeping and new, more animal friendlier ways of pig fattening.

The spectacular technical developments that occurred in agriculture after the 1950's also had dramatic and far-reaching social consequences. They led to an unprecedented exodus of people from the land. As a result, in the late 1990's the social landscape in Dutch farming looked completely different from that in the early 1950's.

At first it was land labourers that had to look for jobs in other sectors of the economy. Next, farmers' sons had to leave, when it became clear that their parental farm could no longer offer sufficient means of existence for an extended family. Finally, after the mid-60s, the (too) small farmers disappeared rapidly, one after another. For the first time in history, the absolute number of workers in agriculture decreased rapidly while, at the same time, an unprecedented process of intensification occurred. From 1890 until 1950, the number of people in the Dutch agricultural sector had increased from 526,000 to about 750,000; a growth that occurred mainly thanks to the successful developments in the horticultural sector and in small farming. However, this number had fallen to about 200,000 by the late 1990's. Consequently the share of the agricultural population in the total Dutch labour force declined from 19% in 1950 to less than 3% in the 1990's; at the end of the 19th century this share had been as high as 32%.

⁴⁵² Bieleman, 'Gewasbescherming', 2000, pp. 222-225.

⁴⁵³ Frouws, 'Mest en macht', 1993; Smit and Siemes, 'Mest en een schoon milieu', 1999.

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The developments behinds these rather abstract figures, have yet another dimension in an almost dramatic decrease in the number of farmers. In 1950 there had been 216,400 farmers with cattle and 270,900 farmers with pigs. These numbers declined thereafter to respectively 45,800 (21%) and 14,500 (5%) in the year 2000 (Figure 4.6).

In the year 2000 the country had about 97,500 agricultural and horticultural holdings (Table 4.1) By far the biggest category amongst them were the 47,085 grazing livestock farms (dairy farms, calf fattening farms, sheep farms, etc.), being 48% of the total number of holdings. Among the non-grazing livestock farms (pig breeding farms, pig fattening farms,

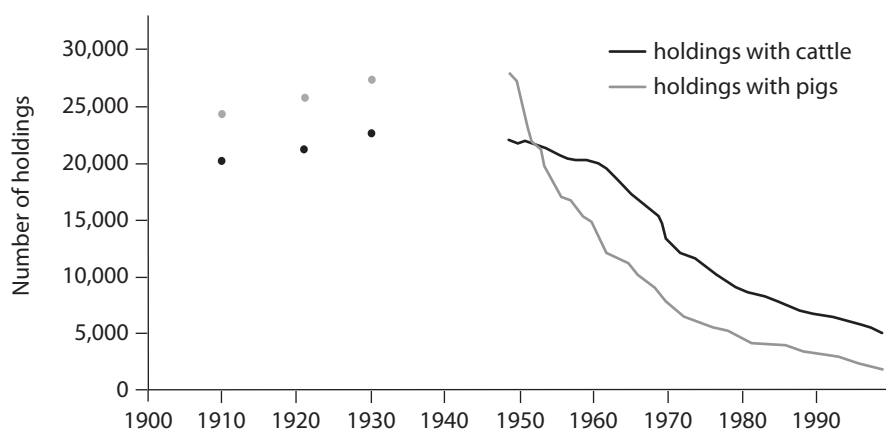


Figure 4.6. The number of holdings with pigs and with cattle, 1910-2000.

Source: National Archive (Den Haag), Archief Directie van den Landbouw, inv. nr. 48; CBS, 'Landbouwtellingen'.

Table 4.1. The number of agricultural and horticultural holdings according to their main activities, in 2000.

	Number of holdings	
	abs.	in %
Arable farms	13,749	14
Grazing livestock farms	47,075	48
Non-grazing livestock farms	8,382	9
Horticultural farms	18,427	19
Combined farms	9,850	10
Total	97,483	100

Source: LEI/CBS, 'Land- en tuinbouwcijfers'.

hen-laying farms, etc.), making up 9% of the total number of holdings, there were 6,063 pig farmers and 1,831 layer farms.⁴⁵⁴ Finally, horticultural holdings constituted almost one fifth of the total number of holdings.

Farmers that stayed were more insecure than ever about their future. Many of those who felt thwarted by the ever present and regulating authorities, sought salvation elsewhere and immigrated to countries like Denmark, the former German Democratic Republic or Poland. Others catered to the increased pattern of spending of many consumers and tried to find a supplementary income in the recreational sphere (mini campsites, bed & breakfast, riding schools, etc.), or by the sales of farm-made regional products. And for some the subsidised nature conservation appeared to be a not insubstantial source of additional income.

In agriculture as well as in horticulture the primary production process at a farm level has long since lost its primacy, as the production column as a whole, the 'chain', consisting of a much comprising and complex network of processing and ancillary industries and services has gained the upper hand. Agriculture, not long ago a strategy for survival for a majority of the population, has become a sector that offers a way of life for a limited group of people, as it became a true 'agri-business'.

⁴⁵⁴ LEI/CBS, 'Land- en tuinbouwcijfers'.

4.2. Arable farming

During the war arable farmers had run their farms with considerably good financial results, although it had been impossible for them to renew implements and make investments. Despite the difficulties they managed to maintain productivity and production of their crops fairly well. Up to the last year of the war the yields of their major food crops were only a little less than former levels.⁴⁵⁵

After the war the arable farming sector was influenced as no other in Dutch agriculture by the rapidly spreading and increasingly large-scale process of globalisation, the birth of a common European market and a centrally formulated European agricultural price policy. As for the farmers themselves, the lack of workers required them to mechanise their farming business energetically, and the recovery of their farm buildings was carried out according to the latest technological developments. Next, the arrival of the tractor brought an important change in their farming practice. Farmers in the marine clay districts profited most from the opportunities the Marshall aid offered them after 1948.⁴⁵⁶ In a short while numbers of tractors increased rapidly there. The results of the agricultural census of 1955 show that in the marine clay districts about one fifth (22%) of the holdings already had one or more tractors at their disposal, while in contrast in the sandy districts it was difficult to find even one farmer with a tractor. Five years later virtually all clay arable farmers had at least one tractor. In the river clay districts and in the *Veenkoloniën* about half of the farmers owned a tractor. The tractor offered the farmer a substantial saving in terms of labour costs. In 1985 a farmer was able to plough 12 ha in one day with his tractor, while formerly a ploughman with his team of horses would only have been able to plough one ha at the most.

Another thing that helped to maintain the farmers' income was a process of rationalisation and up-scaling. From the mid-1960's onwards farm enlargement became ever more important, as part of a land consolidation project or otherwise. The average large farm, that is to say a farm that offered full employment for at least one man, grew from a size of less than 35 ha in the 1950's to almost 60 ha in 1990, a trend that continued thereafter.⁴⁵⁷

The effect of a land consolidation project at a local level becomes clear if we look at the figures concerning a project that was realised on the island of Noord-Beveland, in the province of Zeeland. Land improvements that were implemented here consisted amongst other things of a reconstruction and improvement of roads, a reorganisation of the plots, and a reconstruction of the drainage system. The large-scale project – it covered 7,470 ha altogether – resulted in a drastic change in the agricultural structure of the island as the number of farms, as well as the number of their plots, decreased considerably. The number of farms decreased from 233 to 147, while the average farm size increased from 24.8 ha before to 41.4 ha after the project had been brought to a close. The total number of farm plots was

⁴⁵⁵ Trienekens, 'Tussen ons volk', 1985.

⁴⁵⁶ Priester, 'Paarden en trekkers', 2000.

⁴⁵⁷ Dröge, De Groot and Poppe, 'Bedrijfsresultaten', 1990, p. 56.

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reduced from 1000 to 423, which enabled the farmers that remained to work their business much more efficiently (Table 4.2).⁴⁵⁸

Table 4.2. The farming structure of the island of Noord-Beveland (Zeeland) before and after the land consolidation project in the period 1961-75.

	Before (1961)	After (1975)
Number of holdings	233	147
Number of farm plots	1000	423
Average number of plots per holding	4.3	2.9
Average size of the farm plots in ha	6.3	14.5
Average farm size in ha	24.8	41.4

Source: Wiskerke, 'De Zeeuwse akkerbouw', 1997, p. 50.

Wheat cultivation

The most important crops in clay-arable farming just after the war were wheat, sugar beets and potatoes besides a variety of other crops. In the (marine and river) clay districts wheat was the most important grain, barley the second most important. During the Interbellum period, the Wheat Act that had become effective as a part of the government's program to fight the crisis had caused a drastic increase in the area under this crop: from 57,500 ha in 1930 to more than 140,000 ha in the early years of the war. And although this area had been reduced again during the early 1950's, it still covered almost 90,000 ha at that time. In the marine clay areas wheat together with barley still made up about three quarters of the area under grain although there were important regional differences (Table 4.3; Figure 4.7).⁴⁵⁹

During the Interbellum period the area under wheat was dominated by just a small number of different varieties. One of them was the Wilhelmina variety (named after the then queen) which represented about two thirds of the total area under wheat in the country then. It was followed by a new variety called Juliana in the course of the 1930's. Both modern varieties had ousted the traditional land varieties in less than no time and even before the war the use of these new varieties had counted as standard for a 'good farming practice'. Since the 1950's, however, new varieties succeeded each other in a rapidly increasing tempo in a bid for higher production and in the search for wheat varieties with a higher resistance to crop

⁴⁵⁸ Wiskerke, 'De Zeeuwse akkerbouw', 1997, p. 50.

⁴⁵⁹ Data bank Rural history group, WUR.

Table 4.3. The crop assortment in the northern arable farming district in the provinces of Groningen and Zeeland (excl. the island of Walcheren), in 1950^a.

	Groningen		Zeeland	
	abs.	in %	abs.	in %
Cereals	16,499	46	16,600	36
of which wheat	7,164	20	7,834	17
Pulses	2,397	7	2,795	6
Non food crops	8,444	24	5,511	12
of which coleseed	4,520	13		
Tuber- and root crops	5,662	16	18,663	41
of which sugar beet	3,425	10	9,727	21
Fodder crops	2,454	7	2,387	5
Total	35,456	100	45,956	100

Source: Data bank Rural History Group, WUR.

^a Excluding 73 ha temporary grassland.

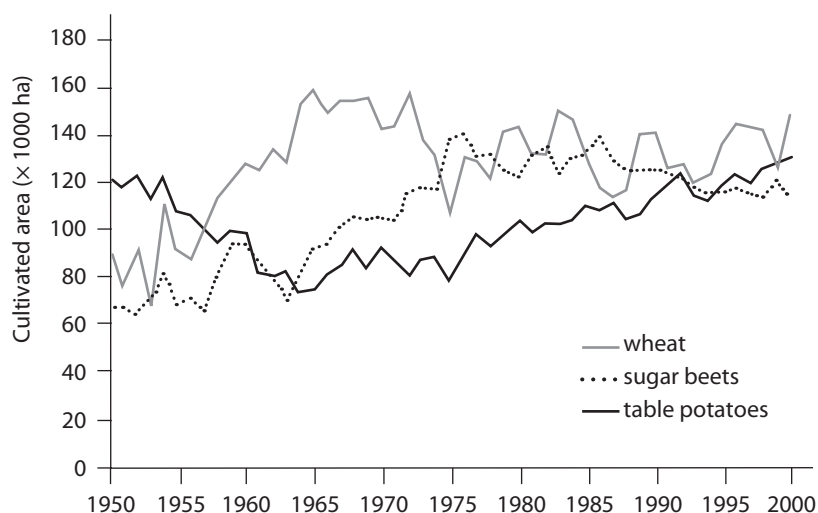


Figure 4.7. The area under the three main crops in Dutch arable farming $\times 1,000$ ha, 1950-2000. After: LEI/CBS, 'Landbouwcijfers'.

diseases.⁴⁶⁰ The problem, however, was that the rapid succession of new breeders' varieties made it difficult for a farmer to decide which to choose. Before, he had time to get properly acquainted with a new variety, another and maybe better one, became available. Another and much more serious problem was the fact that the rapid way in which new varieties were succeeding each other was accompanied by an increasing genetic uniformity. And a consequence of this genetic decrease was that the new varieties seemed to become ever more vulnerable to all kinds of enemies, in particular fungal diseases. Therefore farmers began to rely ever more on chemical compounds: fungicides. The first of these systemic fungicides (chemicals that were used against one specific fungal disease) were introduced on the market in 1968, and soon their use was widespread.

Meanwhile, however, plant breeders had found that striving for higher yields was at odds with another important property of wheat, the baking quality which, in fact, determined the quality of the bread that could be attained with a certain variety of wheat. Ever since the 1930's and as part of the crisis legislation that was meant to make wheat cultivation profitable again, plant breeders had tried to improve the baking quality of the native wheat varieties. The 1931 Wheat Act had determined by means of a *maal- en menggebod*, or a 'grind and blend order', that flour used by Dutch bakers was to be blended to a certain degree from native wheat.⁴⁶¹ A *Tarwecentrale* (Wheat Central) was set up to buy the wheat from the farmers centrally and sell it to the Society of Native Wheat Buyers, called the 'Vita' (*Vereniging van Inheemse Tarwe-Afnemers*). This organisation delivered the wheat to millers and flour makers.

Formally the 'grind and blend order' remained in effect until 1963 and although it was clear that it was possible to grow native wheat varieties with a high baking quality, that did not happen. In their search for more productive varieties breeders had sacrificed this quality for higher productivity. As a consequence, in the mid-1980's flour makers used native wheat only on a modest scale (that is to say for about one fifth) as 'filling wheat' for their flour blend. On top of that, the flour industry hardly paid a good additional price for high quality baking wheat and the marginal price difference did not compensate for the big difference in yields between forage wheat and baking wheat.

While the share of wheat in the crop assortment increased – in the mid-1980's wheat constituted 70% (!) of the total area under grain – the crop took on a totally different function. As prices decreased, wheat was relegated to the function of a rotation crop that was solely cultivated for crop-ecological reasons and only paid a profit if yields were as high as possible.

In addition to the spread of new and more productive varieties, improvements in cultivation methods also contributed significantly to the increase in productivity. And one of the most elementary aspects of it was the increase in the use of artificial fertilisers, especially

⁴⁶⁰ The following is based on: Bieleman, 'Tarweteelt en tarweveredeling', 2000; also see: Maat, 'De veredeling van tarwe', 1998.

⁴⁶¹ As the law came into effect on the 4th of July 1931 this ratio was fixed at 20/ 80; from the 1st of February 1933 it was changed to 35/65. Before Dutch wheat flour was made almost completely out of wheat from abroad.

nitrogen-containing fertilisers: between 1950 and the mid-1980's the use of nitrogenous fertiliser in the Netherlands had more than tripled.

For a long time producing large quantities of long straw was considered to be an advantage, as straw was used for all kinds of purposes. In particular, in the northern marine clay district the length of straw had even increased by the end of the 19th century as the strawboard industry offered farmers a good sales outlet. Moreover, long straw made the crop potentially stronger in its competition with weeds. However, the increasing input of nutrients made the stems of the plant ever weaker and therefore increasingly liable to lodging. The latter made the crop more difficult to harvest, especially now that harvesting was increasingly mechanised. For that reason plant breeders applied themselves to develop varieties with shorter stems, making these new varieties less susceptible to lodging as the nutrient supply remained at the same level or was increased.

Besides the introduction of new short-stem varieties growth regulation compounds were introduced in the course of the 1960's, so-called straw shorteners or plant growth regulators, in order to cope with the lodging problem. These compounds proved to work very effectively, particularly in wheat cultivation. Yet, short-stem varieties together with these stalk shorteners also had their drawbacks: as stalks got closer to the ground, the crop became more vulnerable to disease, especially fungi, which in turn could negatively affect productivity. And this in turn required farmers to use fungicides.

Short-stem varieties became all the more important as ever more farmers began to use combine harvesters to harvest their grain crops; at first, this occurred mainly in the south-western marine clay district. Before the war, agricultural extension officers had been rather cynical about the chances of success for large-scale mechanisation in arable farming in the Netherlands. In 1937 one of the most prominent and progressive advisory officers claimed that there would be room for only three combine harvesters, even taking into account the prospects offered by the new IJsselmeerpolders. And it would not be until 1946 that the first of these machines were used here.⁴⁶² However, in 1960 there were already 6,000 and five years later about three quarters of the total area under grain was harvested with a combine harvester. Thanks to these machines labour demand in arable farming could be curbed drastically. To grow one hectare of grain the labour demand in grain could now be cut back from 190-200 man-hours per year in 1950 to only 15-20 man-hours in 1975.

As labour costs increased weed control became more expensive and the use of (chemical) herbicides increased. The use of these herbicides had begun shortly after the war and during the mid-1970's there were at least one or two different sorts of herbicides available for every crop. And as the traditional wheat varieties were replaced by modern short-straw varieties, the old weed problem had only got worse. Consequently, and as a result of their pecuniary returns, herbicides soon made up the most important group of plant-protecting compounds at that time.



⁴⁶² Priester, 'Het akkerbouwbedrijf', 2000, pp. 87-90.



Illustration 4.3. The farmer and his agricultural advisory officer.

The advisory officer is teaching the arable farmer how to diagnose whether his wheat crop is diseased. Such diagnoses were an important part of the so-called EIPRE programme that started in 1977. Farmer-participants in this programme learned how to recognise certain types of disease and report these to the experts at the programme centre in Wageningen so they would be able to apply the right treatment. It was called geleide bestrijding or 'supervised pest control'; in fact it was a computer-based decision support system. The adage of the project was 'to spray less, but making sure to do it at the right moment. Source: Stichting Historie der Techniek, Eindhoven.

Meanwhile the use of all kinds of fungicides had also increased rapidly, especially the ones that were used to fight yellow rust. And to curb the growing quantities experts designed a monitoring system that came into use in 1977 and went by the name of EIPRE, an acronym for *EPIDemie* (epidemic), *PREDictie* (prediction) and *PREventie* (prevention). The idea was that participating farmers should inspect their wheat crop carefully during the growing season to see if any contagion had occurred. If so, they had to report this immediately by telephone to a team of plant pathologists, in the action centre at the Agricultural University at Wageningen. Subsequently and by return of post they got the advice about whether or not to use a fungicide and how much. The idea of the program was to carefully weigh costs and benefits. In hindsight, EIPRE appeared to be only the prelude to other integrated

cropping systems, designed to achieve an economic farming business and the minimum use of chemical compounds. With its computerised approach it was in fact a pioneer for other automated advisory programs that spread rapidly since most farms had their own computer.⁴⁶³

As a result of a complex of modern inputs an impressive increase in productivity occurred in wheat cropping after 1950. When traditional landraces had dominated wheat culture in the Netherlands, at the end of the 19th century, the average yields were at a level of about 1,800 kg/ha (Figure 4.8; Table 4.4). With the arrival of modern breeders' varieties productivity rose to a level of slightly more than 4,000 kg/ha in the 1950's. About 4 decades later average yields of winter sown wheat had increased to almost 8,000 kg/ha and on the level of individual plots a yield of 10 tonnes/ha was considered as normal. These yields belong to the highest in the world. At the same time – in the mid-1980's – British farmers were able to produce an average of 7,710 kg/ha, while in Germany farmers reached a level of about 6,200 kg/ha. On the other hand, using the labour extensive methods that were

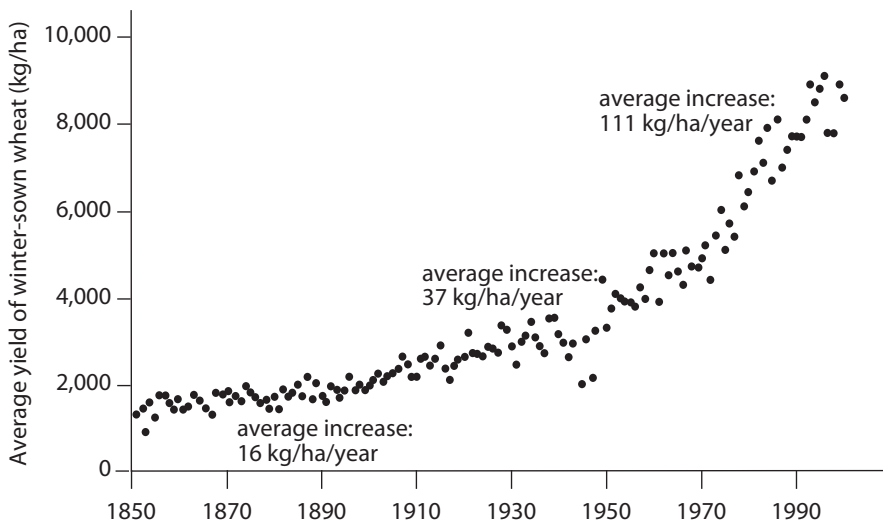


Figure 4.8. The average yield of winter-sown wheat in the Netherlands and the average annual increase¹ in kilograms per ha, 1851-2000.

Source: 'Verslag van de landbouw'; LEI/CBS, 'Landbouwcijfers'; Trienekens, 'Tussen ons volk en de honger', 1985, Table 12 and 13.

¹The average annual increase is calculated over the average yields in the periods 1855-1905, 1906-1955 and 1956-1990.

⁴⁶³ Bieleman, 'Gewasbescherming', 2000, pp. 217-218.

Table 4.4. The average yield of winter sown wheat in the Netherlands in kg/ha, in the period 1851-2000.

	Yields in kg/ha
1851-60	1,450
1886-95	1,830
1936-40	3,150
1951-60	4,100
1986-95	7,990
1996-2000	8,440

Source: Bieleman, 'Tarweteelt en tarweveredeling', 2000, p. 198; LEI/CBS, 'Landbouwcijfers'.

characteristic for grain cropping in large-scale farming in the USA and in Canada yields there reached an average level of respectively 2,601 and 1,610 kg/ha.⁴⁶⁴

How crucial the 1950's were as a juncture in time in this respect becomes clear after calculating the average annual growth in productivity. It then appears that during the second half of the 19th century farmers already managed to improve the crop yield of their 'traditional' landraces by a speed of 16 kg/ha/year. Then, after the first generation of modern, 'scientific' varieties had come the growing speed increased to as much as 37 kg/ha/year. After 1950, however, helped by a complex of new inputs and innovations an annual speed of growth was accomplished of as much as 111 kg/ha. As such, the dramatically increasing yields were of course an important element in the bid to bring down the labour costs per ton of produced wheat. While in 1900 the production of 1 ton of wheat had taken about 300 man-hours, this amount of labour was curbed to as little as only 1½ man-hours during the mid-1980's.

Remarkable, though, was the fact that the interest in high-quality native baking wheat was increasing again during the late 1980's. It was a trend that was embedded in two developments: the introduction of a certificate regulation for baking wheat and a baking quality-related intervention price. The aim of this was to reduce the surplus of wheat by stimulating the cultivation of less productive baking varieties. These things led to a regional initiative such as *Zeeuws Vlegelbrood* (Zealand flail bread). In 1991 a number of young farmers in association with millers and bakers and with the help of some (rural) organisations put a wholemeal bread on the market made of wheat that was produced in Zeeland in an ecologically sound way.⁴⁶⁵

⁴⁶⁴ Bell, 'The history of wheat cultivation', 1987, p. 46 (Table 2.1).

⁴⁶⁵ Wiskerke, 'Zeeuwse akkerbouw', 1997, pp. 237 and 303-336; Van der Meulen, 'Traditionele streekproducten', 1998, p. 47-48.

Sugar beet cultivation

In the early 1950's the marine clay part of north-western Brabant and the adjacent Zeeland and Zuid-Holland islands, as well as the Haarlemmermeerpolder and the young IJsselmeerpolders were the outstanding districts for sugar beet cultivation. Cropping of beets had spread from the south-western parts of the country ever since the early 1860's and in the 1920's nationwide about 60,000 to 70,000 ha of arable land were under sugar beets. Yet, after the Wheat Act had come into effect, in 1931, the area under sugar beet was reduced significantly in favour of wheat, remaining so until the end of the 1940's when beets covered an area of 50,000 ha of arable. From then on, however, it increased again to an area of about 130,000 ha in the 1970's and 1980's.⁴⁶⁶ In addition to the marine clay districts, there was also sugar beet cultivation in arable farming districts elsewhere in the country, in particular in the *Veenkoloniën*.

The cropping of sugar beets, together with the cultivation of potatoes, were the most labour-intensive cultures in Dutch arable farming.⁴⁶⁷ The reason for this was that during the spring the nursing of the young crop demanded an extraordinary amount of labour, as did the harvest in the months of October and November. This labour-intensive spring business had everything to do with the properties of the beet seed itself. Formerly, beet seed consisted of a cluster of small seeds that produced not one seedling – as for instance grains do – but a bundle of seedlings standing very close together. To obtain a high yielding crop, these bundles of seedlings had to be thinned out by hand as soon as they came up, so only one plant remained. This work (*bieten dunnen*) was carried out by hand while creeping or walking bent down to the ground. After that the remaining plants had to be singled (*op eenzetten*) in rows.

During the second half of the 1960's, however, after a long period of experimenting plant breeders managed to develop monogerm varieties of beets. These varieties produced only one instead of a bundle of seedlings. And in about 1970 these varieties were of sufficient quality to be used in farming practice using a precision drilling machine; experts called it 'spaced seeding'. Around 1975 almost the whole arable area under sugar beets in the Netherlands was spaced sown with precision drills.

The mechanised harvesting of sugar beets had not been successful for a long time, and even though technicians had been experimenting with all kinds of machinery ever since the Interbellum period, in 1950 beets were still being lifted by hand. Yet, the drive to push back the amount of labour in the beet culture increased as the costs of labour increased. However, although some new hand tools had become available, it was not until 1955 that the first mechanical lifters came on the market. They were an immediate success. Two years later, in 1957, 20% of the area under sugar beets was being lifted with this new machinery. They were far from perfect, especially because they did not work well when used on heavy clay soils. However, through the years better types appeared on the market and in 1965 more

⁴⁶⁶ LEI/CBS, 'Landbouw- en tuinbouwcijfers'.

⁴⁶⁷ Priester, 'Het akkerbouwbedrijf', 2000, pp. 91-97.



Illustration 4.4. A six rower sugar beet harvester.

In the early 1950's harvesting sugar beets still involved a lot of manual work. This lasted until about 1955 when the first lifting machinery was introduced. By 1957 about 20% of the area under sugar beets was harvested mechanically. Already in the 1970's labour demand in sugar beet cultivation had been cut back to only 10 man-hours per hectare; previously in manual work this would have taken as many as 160 man-hours. The depicted zesrijer (six rower), called 'Big six', was developed in the 1990's by a Dutch company. It weighed 22 tonnes and could carry along 17 tonnes of beets. This giant machine was driven across the land by three dirigible axles and big tyres. Source: Wikipedia.

than two thirds of the sugar beet area was already being lifted with fully automatic lifters. By using machines that could lift six rows of beets in one go (the so-called self-propelled six row beet harvester, or in Dutch *zesrijer* in short; Illustration 4.4) the demand for labour could be reduced significantly. By the 1970's with the help of these machines the lifting of 1 ha of sugar beets took 10 man-hours while formerly, when the lifting was done completely by hand, this took 160 man-hours.

Potato cultivation

For a long time the marine clay districts in northern Friesland and in the south-western delta region (especially the islands in the province of Zuid-Holland) were known to be the pre-



Illustration 4.5. Newly developed nematode injector to fight the potato sickness (aardappelmoeheid). In 1941 potato growers were confronted unexpectedly with a new and unfamiliar disease in their crop, that became known as potato sickness. At first the disease appeared mainly in the Veenkoloniën as it was a direct consequence of the very intensive cropping system that had been practised there ever since the mid-19th century. From the mid-1960's onwards chemical densification was accelerated when cheap nematicides became available. This approach expanded enormously as newly developed machinery like this injector was introduced. Source: Stichting Historie der Techniek, Eindhoven.

eminent district for the cultivation of table potatoes. The above-mentioned region and parts of West Friesland were also known for their seed potatoes while farmers in the Groningen and Drenthe *Veenkoloniën* had been the specialists in the field of industrial potatoes since the second half of the 19th century.⁴⁶⁸ In 1949 these potato growers as well as their colleagues elsewhere in the country were confronted with a yet unknown disease in their crop that caused infertile spots of earth.⁴⁶⁹ This disorder, which became known as potato sickness (in Dutch: *aardappelmoeheid* or AM) was to become a typical phenomenon of Dutch arable farming, or more specifically arable farming in the *Veenkoloniën*. It was closely connected

⁴⁶⁸ 'Landbouwatlas van Nederland', 1959, map 27.

⁴⁶⁹ Bieleman, 'Gewasbescherming', 2000, pp. 214-217.

with the intensive way in which potato cropping had developed due to the emergence of the potato starch industry.

The discovery of the disease that was caused by a parasitic living potato root eelworm had far-reaching consequences for potato cultivation in this part of the country. If the disease spread, it would threaten not only the exports of potatoes – very important for the Dutch exchange reserves – but also exports of a number of horticultural products like flower bulbs. To prevent this, legislative measures were taken in 1949 which ordered a broadening of the crop sequence system amongst other things. From then on farmers were allowed to grow potatoes in uncontaminated fields only once every three years, while cultivation in contaminated fields was prohibited entirely. For most farmers in the sandy or clay districts this measure had hardly any consequences. They very rarely cultivated potatoes more frequently than once every three years. However, for farmers in the *Veenkoloniën* the ruling was a terrible blow. They had been used to growing potatoes on a certain plot of arable every other year, alternating with – for instance – a crop of rye. They talked about a cropping plan of 1:2 and consequently, in general, in the *Veenkoloniën* district potatoes covered about half of the area of arable land. As a result, the area under industrial potatoes that had amounted to more than 36,500 ha in 1948, fell rapidly (Figure 4.9; Table 4.5). In 1956 industrial potatoes covered only about 18,233 ha, or just half of the former area.

However, the measures proved to be ineffective and they could not prevent the further spread of the disease. For that reason, in 1973, new measures came into effect. These ordered that henceforth potatoes were only allowed in uncontaminated fields once every four years, instead of once every three years. More intensive cropping – i.e. more often than once every four years – was only permitted when the land was disinfected and/or the farmers grew resistant varieties. The search for these new AM-resistant varieties had got going in the course of the 1950's and prospects looked good when the first AM-resistant varieties were set in 1963. Unfortunately, the resistance of these new varieties appears to have been broken through only some years later.

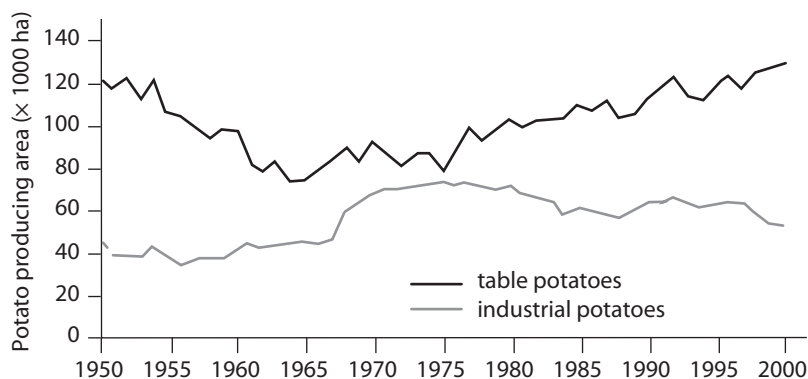


Figure 4.9. The area under table potatoes and industrial potatoes in the Netherlands $\times 1000$ ha, 1950-2000. After: LEI/CBS, 'Landbouwcijfers'.

Table 4.5. The crop assortment in the Veenkoloniën in the provinces of Groningen and Drenthe in ha, in 1948^a.

	Crop area in ha	in %
Grains	31,053	38
of which rye	17,506	22
Pulses	470	1
Non food crops	1,177	2
Tuber- and root crops	42,375	52
of which industrial potatoes	36,538	4
Fodder crops	6,011	7
Total	81,086	100

Source: Data bank Rural History Group, WUR.

^a Excluding 5,584 ha of temporary grassland.

Meanwhile breeding programs were put on a simmer in 1967, when chemical disinfection became economically practical as disinfectants became cheaper. And between 1967 and 1969 the area under potatoes in the *Veenkoloniën* indeed expanded from 11,000 to 27,000 ha. By the mid-1980's on the sandy soils it was possible to kill about 85% of the eelworms. In the clay regions, however, this percentage was lower. As the disinfecting injector machinery was improved, the use of nematicides increased rapidly.

Yet, another factor was that in the 1980's the most important region for seed potato cultivation at that time, the IJsselmeerpolders, had also become infected. And because of the inexorable legislation on this point exports of these important products were seriously threatened. For this reason and merely as a precaution farmers in these polders also began to disinfect their potato land. Consequently arable farming became the biggest user of pesticides by far in the mid-1980's. In the peak year 1986 the total sales of pesticides amounted to as much as 20.6 million kilogram, of which 61% were soil disinfectants.⁴⁷⁰ However, then came a change. When drinking-water suppliers found traces of these products in the subsoil water, the use of nematicides suddenly became the centre of public discussion on the matter of pesticide use. In a short time their use was reduced drastically by – amongst other things – the repeal of the legislative compulsory soil disinfection and the introduction of new AM-resistant potato varieties. As a result the use of nematicides was curbed in just a few years from more than 12,500 tonnes in 1986 to 1,400 tonnes in 2000.⁴⁷¹

Yet, potato farmers were still the biggest users of large quantities of fungicides, in particular table potato growers. In the mid-1980's two thirds of the total quantity of fungicides that

⁴⁷⁰ Oskam *et al.*, 'Pesticide use', 1992.

⁴⁷¹ LEI/CBS, 'Landbouwcijfers'.

were used in the Netherlands was used by potato growers to fight the phytophthora. And at the end of the 20th century fungicides still formed the most important group of pesticides in the Netherlands.

Productivity in potato cultivation also increased spectacularly. In the early 20th century potato yields had been as high as about 12 ton/ha and afterwards this had increased to a level of about 25 ton in the 1950's. However, during the last decade of the 20th century on clay and sandy soils yields were realised of an average of 45 ton/ha and yields of 50 to 60 ton/ha on individual plots were no exception. On experimental fields and under optimal conditions in the *Veenkoloniën* yields of 100 ton/ha were obtained. In addition, spectacular results had also been accomplished in terms of labour productivity. Before the war labour demand in the cultivation of table potato was as high as 30 man-hours per ton; in 2000 this was estimated to be as little as only 0.65 man-hours (Table 4.6). At the same time more attention was given to the finished product: storage and delivery required more than two thirds of the total amount of labour involved.⁴⁷²

The potato culture in the *Veenkoloniën* was especially vulnerable by the end of the 20th century due to the rapidly increasing competition on the international starch market. This caused the potato processing industry AVEBE to shift its activities from the production of crude starch to a large number of high-grade derivatives. By the late 1990's 70% of all the starch produced was processed into about 600 different kinds of these derivatives. These derivatives were used in the paper industry, textile industry, water treatment, building industry, oil and gas extraction, as well as in the adhesives industry. However, competition was increasing on the derivatives market as well.

During the mid-1950's there had been about 20 potato starch factories active in the north-eastern part of the Netherlands; amongst them there were 15 cooperatives.⁴⁷³ Since then, however, this industry had also witnessed a process of up-scaling and at the end of the 20th century the AVEBE company only ran three plants.



Table 4.6. Productivity and labour demand in table potato cultivation, 1920-2000.

	1920	1940	1955	1970	1985	2000
Yields in ton/ha	15	20	25	35	45	60
Labour demand in man-hours/ha	485	454	300	148	70	30
Labour demand in man-hours/ton	32	23	12	4.2	1.75	0.65

Source: Bouman *et al.*, 'Mechanisatie aardappelteelt', 1999, pp. 92-93.

⁴⁷² Bouman *et al.*, 'Mechanisatie aardappelteelt', 1999, pp. 91-94.

⁴⁷³ Hofstee, 'Rural life', 1957, map 24, p. 75.

In general, the process of mechanisation and rationalisation that swept through Dutch arable farming led to scantier cropping plans. In arable farming in Zeeland, for instance, known traditionally for its great variety of crops, a number of non-food crops vanished from the fields. In 1950 flax, coleseed and poppy seed together still covered 12% of the arable; 40 years later this was reduced to only 4%. In the 1980's as wheat cultivation became unprofitable farmers here shifted to potato growing, although this shift required considerable investments. Many of them modelled their cropping plan completely around this crop, even though this meant a lot of spraying to keep the phytophthora under control.⁴⁷⁴ As a result, for many farmers the dependence on potato cropping increased and in some cases about half of their revenue came from this culture. Striking also was the emergence of onion cropping in Zeeland, as well as in the IJsselmeerpolders. Countrywide the area under this crop amounted to as much as 20,000 ha by the end of the 20th century. Onions had always demanded a lot of labour because of all the work involved in controlling weeds. Now, however, the use of herbicides made the crop lucrative. Halfway through the 1970's labour demand for this crop had already been reduced to about 50 man-hours per ha, while earlier the cropping of one ha of onions had taken as much as 600 man-hours.

Increasing surpluses

Until the mid-1970's developments in arable farming were marked by production increases and the stimulation of exports as a means of maintaining and improving the income of farmers. In the course of the 1980's, however, problems induced by the rising surpluses increased. The grain surplus in particular was one of the major issues in the Common Agriculture Policy. Price reduction as a means of curbing production had the opposite effect. Surpluses increased as arable farmers clung obstinately to production increases. Within a European framework politicians worked on implementing a drastic reform of the market and price policy. This led, in 1992, to the introduction of the MacSharry reforms. The idea was to reduce the prices for grains, protein- and oil-containing crops, and compensate the farmers on the basis of a hectare allowance. To be eligible for this compensation large farmers had to leave fallow 15% of the area of these crops. The reforms also contained the introduction of a set of structural measures that included ecologically sound methods of production, taking out of production (nature fallow) and afforestation of marginal farm land as well as stimulating senior farmers (older than 55 years) to retire from their farming business. Yet, the MacSharry reforms were not dictated solely by the necessity to control the rapidly increasing surpluses. They were also – or even primarily – induced by the international and worldwide negotiations within the framework of the GATT.⁴⁷⁵

And prices fell dramatically indeed, in particular those of wheat. During the first half of the 1980's farmers were getting more than 51 guilders per 100 kg, but in the late 1990's

⁴⁷⁴ Wiskerke, 'Zeeuwse akkerbouw', 1997, pp. 48 and 122-125.

⁴⁷⁵ Wiskerke, 'Zeeuwse akkerbouw', 1997, pp. 47-48.



Illustration 4.6. A farmer's family in front of the farm barn in the spring of 1980.

Arable farms in the Netherlands still have very much of a family farm character. This photo shows a farmer's family in one of the Flevopolders in front of their farm barn. The farm, covering 75 hectares of farming land, cultivated the usual assortment of three crops: sugar beets, potatoes and wheat. Expensive machinery was shared with two other neighbouring farming families. The farm employed one labourer. During the holidays the children assisted in the farming work and as did the farmer's wife sometimes. Source: Photo: Kors van Bennekom. Stichting Archief Kors van Bennekom.

they only got a little more than 26 guilders per 100 kg.⁴⁷⁶ Wheat had become a penny crop (*dubbeltjesgewas*) for them. Under these circumstances the discussion emerged to take large areas of farming land out of production. In Groningen, for a part of the Oldambt district, the 'Blue city plan' (*Blauwe stad plan*) was introduced, which implied the submerging of about 800 ha of farming land in favour of a recreation project. In the south-western delta region, plans were developed to 'de-polder' (*ontpolderen*) the island of Tiengemetten, and transform it into a nature reserve. Farmers looked at these initiatives with disbelief. Areas that had been converted into high-grade farming land through the industrious labour of many generations now were to be abandoned in a flash. For many of them this was the world going crazy.

⁴⁷⁶ LEI/CBS, 'Landbouwcijfers'.

4.3. Livestock farming

The post-war recovery of the livestock numbers, in particular poultry and pig stocks was accompanied by many difficulties. Before the crisis of the 1930's – in 1930 – the number of pigs (excl. piglets) had amounted to as much as 1.5 million and in 1939 there were still 1.2 million, in spite of the crisis regulations. Yet, in 1947 there were only 0.42 million left. In poultry keeping a similar trend had occurred. In 1939 there had been 20.9 million hens, a stock that was reduced to only 2 million in the mid-war years, but by 1947 there were still no more than 7 million of them left.⁴⁷⁷ There were serious obstacles to rebuilding stocks, for instance the non-availability of feedstuffs and the lack of currency to buy them abroad, and it was not until 1953 that the rationing of animal feed could be abolished.⁴⁷⁸ And only after 1955 did total milk production really begin to increase beyond the pre-war level.

In those years Dutch livestock farming was still very much characterised by its small scale. This was especially so in the sandy regions in the east and the south, but not only there. And in fact this situation was not very different from that before World War I. Although the total number of livestock keepers had increased, the farm size structure as a whole had remained virtually the same. In the sandy provinces of Overijssel and Brabant, for instance, respectively 68% and 81% of dairy farmers had less than 10 dairy cows (the average size of the herds was 8 and 6.5 dairy cows). Of course, the situation in the livestock farming district in the western part of the country and in Friesland was different. In Friesland, for instance, this category of dairy farmers amounted to as much as 45% of the total number; 25% had 20 or more dairy cows. The average number of dairy cows per farm in this province was 13.9.⁴⁷⁹ There was a similar picture with regard to pig stocks: two thirds of the pig keepers in the sandy provinces had fewer than 10 fattening pigs. In Overijssel and in Brabant the average number of pigs (excl. piglets) was 10.0 and 11.3 respectively.



An important element of the complex mix of (technological) changes that occurred in livestock farming since the end of the 1950's was a process of segregation and specialisation, in particular in the sandy districts. Until then farming there was mixed, with the arable serving the livestock part producing fodder (mainly potatoes and rye). The farmers' income was based on the sale of milk, and the sales of pigs and eggs. In those days it was reckoned that on a farm with 4 to 7 ha of land 21% of the farmer's income was provided by the sale of eggs, while the sale of pigs contributed about 20% to that. The rest came from the milk he sold to the local (cooperative) creamery. For larger holdings the latter was relatively more important.

⁴⁷⁷ LEI/CBS, 'Landbouwcijfers'.

⁴⁷⁸ Van Adrichem Bogaert, 'De ontwikkeling', (1970), pp. 259-261.

⁴⁷⁹ According to the cattle census in May 1959; CBS, 'Landbouwtelling'.

Even in 1950 agricultural economists reckoned that ‘small farming in the future will be typically a farm with many pigs and poultry’.⁴⁸⁰ And in 1953 a Poultry Regulation (*Pluimveeregeling*) ordered that poultry keeping would remain an inseparable part of the small mixed farms. Although not completely unquestioned, the regulations directed that the size of the poultry stocks were to be related to the area of land a farm had.⁴⁸¹

Shortly afterwards, however, ideas were already changing. In 1957 advisory officers had begun cautiously to propagate the idea of specialisation among the farmers on mixed farms. In the same year the state advisory officer in Overijssel wrote: ‘The farmer has to specialise in the part of his farm he feels the most affinity for. After all therein is his advantage’.⁴⁸² And he explicitly added to this idea that in fact for pig and poultry keeping no farming land was required at all. Both could be kept on the basis of imported and purchased fodder. The Poultry Regulation that had already been adopted in 1959 was abolished in April 1961.

So, ever since the early 1960’s the traditional mixed farming system began to ‘dissolve’, to make way for specialised dairy farms, specialised pig farms and specialised poultry farms. The latter two developed into ‘foot-loose’ types of stock farming and soon other kinds of specialism developed.

Pig farming

Ever since the mid-19th century pigs had become the farm animal par excellence in the sandy districts. True, before the war a lot of pigs were also kept on many farms in the Utrecht/Holland livestock region. These farmers, however, had focused on the domestic urban market, while farmers in the sandy districts were producing pigs for the export market.

Meanwhile, by 1960 there were 1.67 million pigs⁴⁸³ in the country again. And when in the middle of the 1980’s a period of stagnation began, the total number of pigs amounted to as many as 9 million. What was especially striking was the fact that this growth happened mainly in the south. In a fairly short period of time – say 25 years – the province in Brabant above all became a ‘pig country’ par excellence. In the mid-1980’s this province accommodated 40% of the national pig population, increasing later to 43%.⁴⁸⁴ The second pig-province Gelderland had 23% in 1985 (Figure 4.10; Table 4.7).

At an early stage already a certain kind of regional differentiation had developed between regions where farmers had specialised in pig breeding only (to become the producers of piglets), i.e. south-western Drenthe, Salland and the Land van Maas en Waal, and regions where both pig fatteners and pig breeders were to be found.⁴⁸⁵ After 1960, however, pig breeding and pig fattening increasingly developed into sub-sectors. Thereafter, since pig keeping broke loose from the traditional mixed farming type specialism developed according

⁴⁸⁰ Maris, Scheer and Visser, ‘Het Kleine-boerenvraagstuk’, 1951, pp. 77-80

⁴⁸¹ Bieleman, ‘De legkippenhouderij’, 2000, p. 166.

⁴⁸² Broekhuis, ‘Landbouw en specialisatie’, 1957, pp. 405-406.

⁴⁸³ Not including piglets.

⁴⁸⁴ CBS, ‘Landbouwtellingen’; Michel, ‘Entwickelungen und Strukturen’, 2004, pp. 97-102.

⁴⁸⁵ (Löhns), ‘Varkenshouderij in Nederland’, 1906, annex 1.

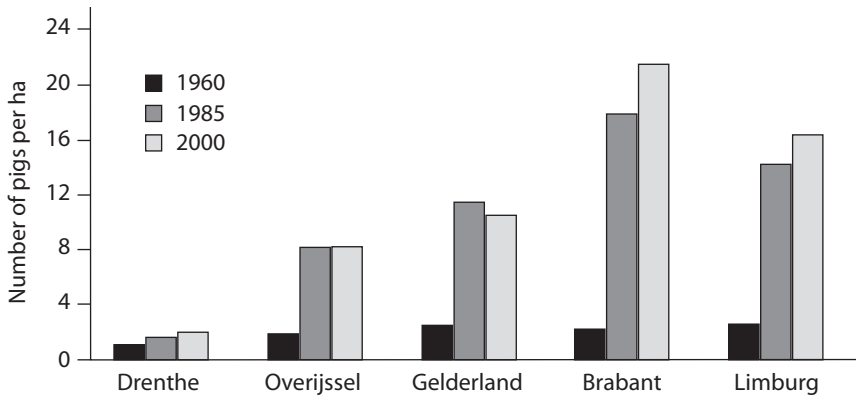


Figure 4.10. The number of pigs (all categories) per ha of farming land in the five sandy provinces¹, in 1960, 1985 and 2000.

After: LEI/CBS, 'Landbouwcijfers'.

¹Drenthe, Overijssel, Gelderland, Noord-Brabant and Limburg.

Table 4.7. The number of pigs (all categories) per ha of farming land in the 5 sandy provinces, in 1960, 1985 and 2000.

	1960	1985	2000
Drenthe	0.86	1.41	1.81
Overijssel	1.67	7.99	8.05
Gelderland	2.30	11.30	10.33
Noord-Brabant	2.02	17.71	21.38
Limburg	2.38	14.03	16.13

Source: CBS, 'Landbouwtellingen'.

to the three phases that can be discerned in pig farming: (1) the production of breeding sows, which were subsequently producing piglets on so-called (2) multiplication farms, that were (3) fattened for slaughter at fattening farms. Some farmers, however, chose to combine the phases on one farm, turning it into an integrated, closed system. The numbers of this type of farm, however, remained relatively small.

The multiplication farms delivered their piglets to the fattening farms when they had reached a weight of about 25 kg. Subsequently these piglets were fattened until they weighed about 110 kg. Taken together the fattening farms fattened about 21 million pigs ready

for slaughtering, around the mid-1980's. Most of these pigs were slaughtered in Dutch slaughterhouses; 3.1 million were exported.⁴⁸⁶ After all, about half of all the pork that was produced here was exported (Table 4.8).

The sensational growth of the pig stock went along with a similarly impressive process of scaling up, as the number of pig keepers fell dramatically. In 1950 there were still almost 271,000 pig keepers, with an average number of 6 to 7 pigs per farm (including the piglets). Most of these farms were in fact mixed farms. At the end of the 20th century, however, the Netherlands only counted 14,500 pig keepers. Amongst these were 13,000 farms with fattening pigs of which one third had more than 500 animals (Table 4.9a). Besides these there were 6,100 farms with breeding pigs, of which 42% had more than 200 (Table 4.9b).

Besides the pig farmers a large number of other sorts of companies and agencies were active in forming the chain. An important group was formed by the dealers and transporters who took care of the collection and distribution of breeding and fattening pigs and the export of pigs. Then of course there was the meat processing industry. As in other processing industries here too a process of concentration and scaling up began from the 1960's onwards.⁴⁸⁷

The process of scaling up had accelerated since the 1970's, as a result also of a number of measures in the government's policy to improve the structure of Dutch agriculture. An interest subsidy regulation in 1972 and a law stimulating investments in 1978 greatly encouraged farmers to build large and modern pig houses. The new types of pig housing

Table 4.8. The relative composition of the sales of pork (in %), in 1986.¹

Destination	in %
Household consumption	18
Bulk-consumers	11
Processed into meat products	14
Fat rendering industry	2
Processed into snacks	1
Exports	54

Source: Klein Kranenberg and De Vlieger, 'De distributie van vlees', 1988, Figure 4.1.

¹ The total available quantity of pork from slaughterhouses and imports amounted to 1.5 million ton (= 100%). About only 1% of the total available volume of pork was imported.

⁴⁸⁶ Van Driel, 'De distributiestructuur van varkens', 1988.

⁴⁸⁷ Michel, 'Entwickelungen und Strukturen', 2004, pp. 110-113; Boston, 'Analysis of the Dutch pork industry', unpublished thesis.

Table 4.9a. Holdings with fattening pigs according to their number of pigs (≥ 20 kg), in 2000.

Number of pigs (average 504)	Number of holdings	in %
1-199	4,853	38
200-499	3,816	30
500-999	2,479	19
≥ 1000	1,747	13
Total	12,895	100

Table 4.9b. Holdings with breeding sows according to their number of sows (≥ 50 kg), in 2000.

Number of sows (average 219)	Number of holdings	in %
1-99	1,701	28
100-199	1,862	30
≥ 200	2,537	42
Total	6,100	100

Source: CBS, 'Landbouwtelling 2000'.

were equipped with computerised feeding systems, heating and ventilation systems and slurry removing systems.



An important element in the rapidly changing pig fattening sector was the exceptionally rapid growth of stock feed supply. At first, at the end of the 1940's and stimulated by the lack of feedstuffs farmers in the sandy districts became acquainted with the technology of steaming potatoes as potatoes had been abundant.⁴⁸⁸ In addition, there was still the skimmed milk that farmers had traditionally received in return from their cooperative creamery. However, when these creameries applied themselves more and more to the production of cheese the available volume of skimmed milk rapidly diminished. From then on high-protein

⁴⁸⁸ 'Verslag van de landbouw' over 1949, p. 16.

fodder had to be imported and as these imports increased rapidly the role of the feedstuff industry became increasingly important.⁴⁸⁹

During the 1960's and 1970's the feedstuff industry switched over to imported, cheap raw materials usually of tropical origin. At the same time, rye, which had dominated the arable in the sandy districts for centuries and which had become the farmers' major feedstuff, disappeared (Figure 4.11). In the mid-1980's this industry imported already more than two thirds of their raw materials from outside the EEC. As a consequence, 60 to 80% of national pork production was based on imported feedstuffs.⁴⁹⁰ Excellent and short connections by road and canals between Rotterdam-Europoort and the hinterland offered Dutch pig fatteners a major advantage in comparison with their colleagues elsewhere in Europe. Besides this the feedstuff industries usually offered young, starting pig farmers favourable financing schedules to build new, modern pig housing in return for a contract. This enabled many farmers' sons on the often too small, mixed farms to establish their own pig farm without having any land at all.

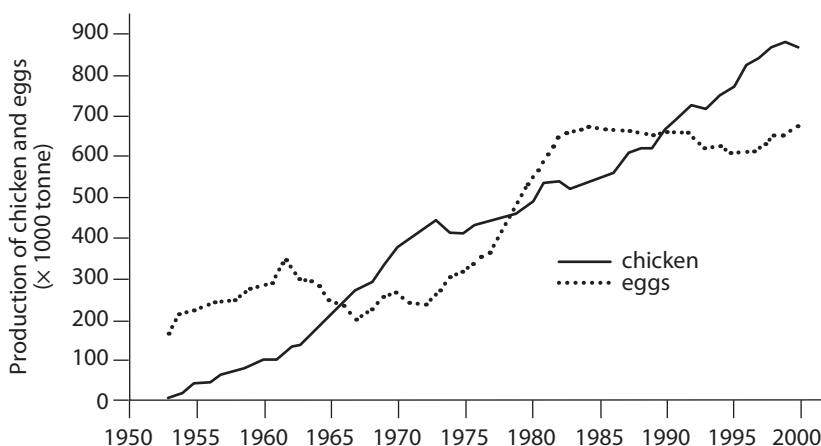


Figure 4.11. The production of chicken¹ and eggs × 1,000 tonnes, 1953-2000.

After: LEI/CBS, 'Landbouwcijfers'.

¹ Live weight.

⁴⁸⁹ Until the First World War feedstuffs had been mixed and prepared on the farm. During that war some feed dealers began to put ready-made mixed feedstuffs on the market. The feedstuffs, however, often appeared to be of an inferior quality. As a consequence, in 1920 the government came up with a law regulating production. Yet, controlling compliance with these regulations appeared to be difficult in practice. For that reason the farmers' societies took over and established a control institution that had far-reaching authority and only the farmers' own cooperative buying societies were allowed to submit themselves to this type of control.

⁴⁹⁰ Michel, 'Entwickelungen und Strukturen', 2004, p. 121.

Thus, a rapidly increasing flow of imported feedstuffs, together with a process of specialisation and scaling up, could lead to highly intensified forms of livestock farming on farms that hardly had any land or non at all. When these developments were at their peak, about the mid-1980's, 39% of all pigs – about 9 million heads (not including the piglets) – were kept on farms with less than 5 ha of land. Experts began to talk about foot-loose livestock farming (*niet-grondgebonden landbouw*). This was a phenomenon, however, that took place on a big scale even in poultry farming. At the end of the 20th century the Netherlands had by far the highest concentration of pigs in the world. On average, Dutch pig keepers held 40 pigs per ha farming land, while their Belgium colleagues 'only' had 25 per ha. Danish pig keepers, traditionally the big competitors of the Dutch, had fewer than 10 pig per ha of their farming land.⁴⁹¹

Feedstuffs came from elsewhere, animals and pork were exported, the manure they produced, however, stayed here and its volume became bigger and bigger. For some time experts did not see this as a problem. 'Concentrates are fertilisers' they claimed. They believed that an increasing number of livestock and the increasing quantities of concentrates that were fed implied that farmers could do with fewer artificial fertilisers.⁴⁹² However, as the number of pigs grew (and consequently the volume of slurry that was produced as well) the consumption of artificial fertiliser also increased. And although some were uttering the first warnings about the increasing volumes of manure being a (nutrient) surplus problem, it was not until the mid-1980's that the authorities came up with measures.

Intervention appeared to be inevitable and from 1984 onwards restrictive regulations were promulgated to curb the environmental effects. When these first regulations appeared to be insufficient measures were tightened in 1987. Farmers were then compelled to set up manure accounting system which many of them experienced as a far-reaching infringement of their individual economic freedom. In the 1990's this systems was refined. As a part of these regulations pig (and poultry) manure was distributed more evenly across the country. And from then on large lorries began to transport slurry from the districts with a high density of pigs and poultry to low density districts where farmers could use animal manure.

In addition to all the problems connected with the surplus of manure, pig farmers were also faced with the disruption brought on their business by the (classic) swine fever. Between February 1997 and March 1998 429 farms were hit by the disease and almost 650,000 of their pigs were destroyed. More than one million pigs had to be killed to prevent the epizootic spreading any further and 8 million animals – especially piglets – had to be exterminated when housing became overcrowded. In total the epizootic cost the lives of 12.5 million animals. The disaster caused great economic damage to the sector, not to mention the personal, emotional distress many pig farmers went through and the harm done to the animals. Again the discussion arose as to whether the size of the pig stock should or should not be drastically reduced. Yet, it is questionable whether an epizootic on this scale could

⁴⁹¹ 'The pig sector', 2003, p. 50. These figures concern the area of farming land per farm and are therefore different from the ones presented in Table 4.7 which are about the total area of farming land in every province.

⁴⁹² Frouws, 'Mest en macht', 1993, p. 77; Bieleman, 'Van traditionele naar technologische vruchtbaarheid', 1996.

have been prevented if pig farming had not been intensive in character as it was here. All the more so because the standards for animal health and hygiene on these large, specialised pig farms were already very high indeed.⁴⁹³

Poultry farming

In the 1920's and 1930's poultry keeping had developed into what the German agronomist Julius Frost then called a 'decentralised large-scale industry', that exported a large part of its production. Just before World War II the value of the annual exports of eggs amounted to as much as about 35 million guilders, much more than the total value of the exported quantities of cheese and bacon.⁴⁹⁴

After the *Pluimveeregeling* (Poultry Regulation; a regulation set up in 1952 and designed to prevent an excessive expansion of the poultry stock to keep it linked with mixed farming) was abolished in 1961 there were no longer any constraints on poultry numbers. Shortly afterwards, however, a difficult if not dramatic period for the sector began, when – in 1962 – the regulations brought about by the Common Market came into effect. These regulations implied that all the participating countries had to pay a certain levy to compensate for the differences in production costs that went along with the differences in the level of productivity. For Dutch poultry farmers in particular they implied that during the first year the levy was already higher than the import duties to a country like Germany had formerly been. As a consequence exports of shell-eggs fell from 3,087 million in 1961 to only 763 in 1967 causing the poultry sector great problems. And although the regulations were abolished in 1967, moods remained depressed until into the 1970's.⁴⁹⁵

In 1963 the Dutch government instituted a *Ontwikkelings- en stimuleringsfonds* (Development and stimulating fund) to relieve the immediate distress. In the long term, however, this fund was intended as a reconstruction fund, which, within the framework of the reconstruction of the Dutch agricultural sector, would provide assistance to farmers who wished to terminate their farm business. Their land then became available for other farmers. Many small farmers did indeed stop when the O&S fund offered them the opportunity to do so. In a few years the number of poultry keepers fell sometimes by a 10,000 annually. In 1961 there had still been almost 172,000 farms with laying hens (virtually all of them were of the traditional mixed farming type) but by 1980 their numbers had dropped to less than 5,600.⁴⁹⁶

⁴⁹³ Michel, 'Entwickelungen und Strukturen', 2004, pp. 131-132; Stegeman *et al.*, 'The 1997-1998 epidemic of classical swine fever', 2000, pp. 183-196.

⁴⁹⁴ The value of the exported cheese and bacon respectively amounted to as much as 27.0 and 20.7 million guilders per year, while the total value of the exported butter then was as high as 42.6 million guilders. 'Verslag van de landbouw' over 1936-1939.

⁴⁹⁵ The following is mainly based on: Bieleman, 'De legkippenhouderij', 2000; see also: Ketelaars, 'Historie van de Nederlandse pluimveehouderij', 1992.

⁴⁹⁶ LEI/CBS, 'Landbouwcijfers'.

For some the alternative, however, was to specialise and in practice this also meant expanding. Taken together these factors were the ingredients for an unprecedented process of specialisation and scaling up as poultry keeping was detached from the traditional mixed farming type to become a separate and highly specialised sector – like pig keeping and dairy farming. Otherwise it became clear that as prices and costs were developing the problems poultry keeping faced could only be solved by far-reaching improvements in efficiency. And these improvements concerned in particular the spread of a new, revolutionary type of housing: the laying batteries.

An important factor that stimulated the spread of this innovation was the feedstuffs industry as some of these manufacturers began to propagate this new type of housing. They offered the farmers laying batteries at favourable prices in combination with an intensive advisory service in return for a contract to buy their feedstuffs.

After 1965 the new housing system began its rapid advance and in 1969 40% of all hens were already being kept in batteries (most of them were of British make). Halfway through the 1970's this share had increased to 79% and in 1985 countrywide 95% of the laying hens were housed in this way. Previously, one man could handle about 5,000 to 7,000 hens; now with laying batteries this number increased to between 10,000 and 12,000.

The first criticism of the new housing system was heard long before it had spread, in 1963. Around 1970 protests against the use of laying batteries became louder and more vicious and in 1975 the 'Pressure group for the rights of everything that is living' (*Belangengroep voor de rechten van alles wat leeft*) began a campaign to try to persuade consumers to choose eggs from litter stables. Shortly afterwards the words *scharrelkip* and *scharrelei* (free-range hen and free-range egg) were introduced. Thereafter, consumption increased rapidly and the production of 'alternatively' produced eggs amounted to about one fifth of the total production by the end of the 1990's.

Meanwhile, the Dutch laying hen had become a completely different animal. Before World War II poultry breeders worked on the basis of the so-called pure-line breeding system (as practised in cattle breeding). It was a breeding method in which only animals of the same variety or breed were mated to try and optimise its qualities and which was strongly orientated towards the animals' exterior and towards model types. The approach was formalised in 1931 and acquired a binding status within the framework of the government's crisis legislation in 1934. From 1948 onward a number of Dutch breeders began with a new breeding method, called 'hybrid breeding'. The method was based on the heterosis effect, an effect that appears when two different, more or less pure lines are crossbred.

Before the war poultry keeping was dominated by breeds like the White Leghorns and the Rhode Island Reds. (The legendary *Barnevelder* – named after the then famous poultry centre Barneveld, a small town in the western Veluwe region – had been taken out of the henhouses by the 1920's). In 1937 the Leghorns and the Reds formed respectively 83% and 12% of the national poultry stock. However, during the 1950's both were quickly pushed aside by the new crossbreeds. At first these crossbreeds were based on the traditional inland

Part 4 – The period 1950-2000

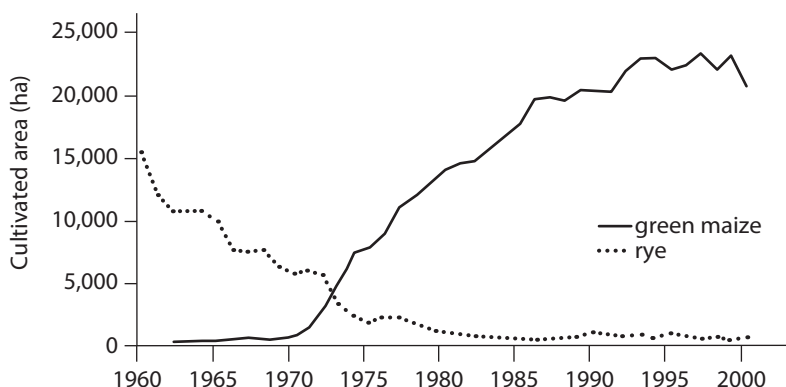


Figure 4.12. The area under rye and under green maize in the Netherlands in hectares, 1960-2000.

Rye, the traditional grain crop of the sandy districts for centuries together with other feedstuffs as mixed feed, was replaced by cheaper feedstuff of tropical origin in the course of the 1960's. After the early 1970's green maize became very popular as roughage because of its high nutritional value which it kept after being ensiled. Production and harvesting required very little labour and could be farmed out to agricultural contractors. After: LEI/CBS, 'Landbouwcijfers'.

breeds, soon however breeders changed over to imported foreign (i.e. American) breeds. Around 1990 about two thirds of all Dutch laying hens originated from foreign dams.⁴⁹⁷

The result of all this was an impressive increase in the total egg production (Figure 4.12). In 1953, the year in which the *Pluimveeregeling* had become effective, total Dutch egg production had amounted to as much as 164.000 tonnes (or 2.8 billion eggs); this was the first year production had risen above the pre-war production. In the following years production increased rapidly and in the peak year 1962 it amounted to as much as 344,000 tonnes. After that, however, production fell dramatically due to the sales problem on the Common Market, a crisis that continued into the first half of the 1970's. Then production rose again to 666,000 tonnes or 1.1 billion eggs in 1984. Most of these eggs – 6.3 billion or 57% – were exported. Furthermore, as an important exporter of shell eggs the Dutch poultry sector had also become a major exporter of hatching eggs and chickens.

This impressive growth was based on a sensational increase in productivity. Improved fodder, dispensed more efficiently, combined with better housing systems and of course a purposeful selection of hens had resulted in much higher productivity even before the war. At the end of the 19th century Dutch laying hens produced as many as 80 to 85 eggs per year and in the 1930 experts estimated productivity to be as high as 116 eggs. During the 1950's it was calculated that the average egg production in the Netherlands amounted to as much as 193. The figure makes clear that even in the dark years of the Interbellum crisis significant

⁴⁹⁷ Bieleman, 'De legkippenhouderij', 2000, pp. 173-176.

progress had been made. After a period of stagnation, during the 1960's, productivity rose again to an average number of 284 eggs per hen per year in the period 1986-90.



As poultry stocks grew, disease prevention became an ever more important issue. Health services and the agricultural advisory service extensively promoted a 'one age system' (*eenleeftijd-systeem*), to try to reduce the risks of group infections. According to the new system the hens of one farm unit were all replaced at the same time. Experts talked about an 'all-in-all-out system'. And only big, specialised rearing farms were able to deliver these large numbers of young hens to the laying farms.

The system also meant that table chickens and laying hens were no longer kept together on one farm as had been common practice until then. Consequently a division between a laying sector on the one hand and a meat sector on the other was put into effect. As for the animals themselves a sharp difference between laying breeds and broiler breeds developed.

No less important was the fact that the centre of gravity in the poultry sector shifted from the traditional poultry centres in the Gelderse Vallei (Barneveld and environs) to south-eastern Brabant and the central part of the province of Limburg. Right there also the newly developing broiler sector emerged.

Keeping poultry only to produce meat was a specialised business that had begun to develop after the war, and speeded up rapidly at the end of the 1950's.⁴⁹⁸ Up till then the poultry meat market had been a small-scale business controlled by poulterers; poultry meat consumption was still very low then. However, in 1949 the first small-scale poultry slaughter house was established in the village of Mill (eastern Noord-Brabant) followed by another in the eastern part of the country in 1954. In 1950 a mere 10,000 tonnes was produced, but in 1960 production had already increased to almost 100,000 tonnes and from then on things really accelerated (Figure 4.12).⁴⁹⁹

It was also striking that from then on the feedstuff industry and meat businesses began to take responsibility for the organisation of poultry meat production themselves more and more. Based on contracts collaborations were started between the links of what had meanwhile been defined as a production chain. And when the laying sector got into serious trouble during the early 1960's and the laying hen stocks were reduced, the meat sector went on expanding. As a result this new sector was of similar economic importance to the laying sector by the beginning of the 1970's. Finally, at the end of the 1990's, meat production had a magnitude of about 850,000 tonnes. That amount was produced on approx. 1,300 highly specialised farms. Most of them were to be found in the eastern parts of the province of Brabant and the adjacent part of the province of Limburg. Countrywide, in addition to these broiler farms there were about 2,100 laying hen farms with an average of 15,000 hens per farm.⁵⁰⁰

⁴⁹⁸ Ketelaars, 'Historie van de Nederlandse pluimveehouderij', 1992.

⁴⁹⁹ LEI/CBS, 'Landbouwcijfers'.

⁵⁰⁰ LEI/CBS, 'Landbouwcijfers'.

Dairy farming

From the early 1960's onwards dairy farming also went through a complex mix of technological and institutional changes. One of the most radical innovations was the replacement of the age-old hand milking system by machine milking. The first, properly functioning machines had appeared on the Dutch market in the 1920's, although their numbers were initially very small; very few dairy farmers could afford to buy one at that time. Of course this was partly due to the fact that dairy stocks were small, especially in the sandy parts of the country. For an average dairy farmer a milking machine of 1,500 guilders was simply too expensive, especially in the dark and insecure 1920's and 1930's. However, from the mid-1950's the number of machines rapidly increased. Between 1950 and 1960 – so within one decade! – the number of machines grew tenfold from 4,000 to 39,000. In the sandy regions one in every five farmers already had a milking machine. This was less than in the livestock farming districts – where one in every three dairy farmers had one – but stocks were much smaller in the sandy regions. During the following decade growth slowed down somewhat, yet it was still spectacular, as numbers increased to about 85,000 installations in 1970. Consequently the relative number of cows being milked mechanically increased from 5% in 1950 to 90% in 1970.⁵⁰¹

So, after a long introductory period the milking machine had spread rapidly.⁵⁰² The quick acceptance was partly due to the fact that it had become ever more difficult for large farmers to get skilled hand milkers, due to the tight labour market. During the 1950's it was clear that land labourers could earn higher wages outside the agricultural sector, under better working conditions. Yet, an increasing shortage of skilful hand milkers was not the only reason why farmers purchased a milking machine. As prosperity increased in general and the amount of leisure time in the other sectors of the economy increased too, the age old handicraft became less and less appreciated by the farmers' family members.

Initially, mechanised milking still had a long way to go on the question of labour productivity. An important step, however, was made when the process was automated and a milker was able to milk more than one cow at a time. Next came the so-called herring-bone milking parlour in the early 1970's. On modern, front-runner farms it was possible to milk 50 to 60 cows with such a milking parlour; 20 years earlier a handmilker in a tie-up cowhouse had only been able to milk ten at the most.

The milking machine not only gave the farmer the opportunity to make substantial savings in labour costs. It also enabled him to keep fewer personnel, or work less himself. Of course, he could also keep a larger number of cattle which enabled him to pay off the investments he had to make to purchase the milking installation and connected milk lines, milking parlours, etc. The milking and the associated innovation clearly had an up-scaling effect.

⁵⁰¹ LEI/CBS, 'Landbouwcijfers'.

⁵⁰² The following is based on Priester, 'Het melkveehouderijbedrijf', 2000.

One factor that also stimulated the rapid acceptance of the milking machine was that the machinery and all associated equipment could easily be installed in the traditional tie-up cowhouses. Only milking outside on the grass was a problem. But this was solved by the introduction of the mobile milking parlour – a British invention dating back to the early 20th century.

During the 1960's and 1970's, when the milking machine appeared on the scene, Dutch cattle was put indoors practically without exception in the traditional tie-up cowhouses. However, at an early stage technical experts and 'trend-setting' farmers had been searching for alternatives. A feasible concept came about when three Dutch farmers built so-called cubicle stables (*ligboxenstal*), following an English example. Initially, however, experts were more enthusiastic than farmers. Yet there was a breakthrough after the establishment of an interest subsidy act in 1972. After that things moved fast. About 80% of all cubicle stables that were built thereafter were built with an interest subsidy. A new act (the *Wet Investeringsrekening* or WIR) that came into effect in 1978 stimulated the climate for investment even more. Strikingly, most of the new cubicle stables mushroomed in the sandy districts, especially in the province of Brabant. The traditional livestock farming province lagged behind. This had everything to do with the process of specialisation and segregation of the traditional mixed farming system.

Simultaneously with the spread of the cubicle stable another innovation came into its own: the milk cooling tank, which replaced the familiar milk cans that had been used ever since the late-19th century. Between 1959 and 1962 this innovation was installed in virtually every dairy farm. The milk tank or deep cooling tank allowed farmers to keep their milk for two or three days at a temperature of 4 °C and a couple of times per week the mobile milk collection tanker (*rijdende melkontvangst* or RMO) collected the milk to bring it to the factory. In the early 1980's hardly any of the traditional cans were to be found.⁵⁰³

In addition to the rise in popularity of the cubicle stable and the milk tank in the 1970's and 1980's dairy farmers also became acquainted with the first generations of computers which took over their job of distributing concentrates and registering the milk yields of their individual cows. Eventually, in the mid-1980's the first test models of milking robots appeared and so, about 80 to 90 years after the milking machine was introduced, it was possible to milk cows without a milker.

Meanwhile, the arrival of the milk cooling tank and the RMO had led to a process of scaling up in the milk processing industry as well. Until then many villages had had their

⁵⁰³ The way the government and the cooperatives tried to stimulate farmers to invest by purchasing a milk tank did not go unchallenged. In fact, there was even more resistance than with the introduction of the milking machine and the cubicle stables. This was all about the way the government used the introduction of the milk tank as an instrument in its readjustment politics, aimed at improving the overall structure of Dutch agriculture. By making the purchase of a cooling tank compulsory, farmers were forced to decide whether to stop their farming business or to invest in it. The latter usually meant that they had to plunge deeply into debt. The policy was strongly opposed and sometimes led to a furious atmosphere between milk factories (most of them cooperative!) and farmers, in what truly became a 'tank war'. Yet, their grievance against the innovation was not merely a matter of money. The simple fact that they had no choice about whether to stop or to switch hurt a lot.

own (cooperative) creamery – usually the pride of the local community. Now, however, milk transport from farm to factory could be regulated much better and the factories could manage with a much simpler milk intake system. Milk transport not only became much cheaper, the RMO's could cover much greater distances than the traditional milk collector. And consequently the process of centralisation and merging in the milk processing industry that had begun in the 1960's could now be completed.⁵⁰⁴ In 1949 there were still about 577 creameries, almost three quarters (72%) of which were cooperatives; at the end of the 1990's there were only a few left.⁵⁰⁵ The creamery had disappeared from the village or taken on a new role ranging from garden centre to carpet market.



The trend for ever larger holdings went along with a process of intensification of land use. As the number of cattle increased the required area of pasture land became scarce and many dairy farmers with cubicle stables felt it necessary to use their lands more intensively and buy more concentrates. And by applying more and more fertiliser roughage, production could be increased.

Typical of this process of intensification was the emergence and rapid expansion of green maize. Even before the war, experiments had been carried out on a pilot farm (of the provincial farmers' society) in Overijssel to see how green maize could be used for roughage, but they were stopped after some time.⁵⁰⁶ Then, in 1949 a number of farmers in the easternmost part of the province of Overijssel established a so-called *maiskern* (a study club) to develop the cultivation of green maize, with the help of a State extension officer.⁵⁰⁷ It was not until the 1960's, however, when good harvester machines became available that the crop really became successful. From then on the area under green maize was extended from about 3,000 in the mid-1960's to 6,400 ha in 1970 and eventually to more than 230,000 ha by the mid-1990's.⁵⁰⁸ By that time, it had become the most important crop in Dutch agriculture except for grass; the great majority of it was to be found in the eastern and southern (sandy) parts of the country.

In spite of the rise of green maize as roughage and the ever growing volumes of concentrates that were fed to the stocks grassland retained its importance. What did change were the methods of processing and conserving the grass harvest. For centuries once it had been harvested grass was conserved as hay. From the 1970's this method of acquiring roughage was replaced by silaging. Silaging had been introduced in the Netherlands already before 1900 and although the generally used methods worked rather well they used a lot of labour and the required machinery was expensive. For that reason haying remained most popular. A change came in 1947 when a livestock farmer in Friesland accidentally found

⁵⁰⁴ Willemsens and De Wit, 'De bakermat', 1995.

⁵⁰⁵ Hofstee, 'Rural life', 1957, p. 73 (map 22).

⁵⁰⁶ Bieleman, 'De Overijsselse landbouw', 2003, p. 164.

⁵⁰⁷ Siemes, 'Een groene revolutie', 1985, pp. 18-19.

⁵⁰⁸ LEI/CBS, 'Landbouwcijfers'.



Illustration 4.7. A cyclomower at work.

In 1964 P.J. Zweegers, owner of a farm machinery company, constructed a new type of cyclo-mower that would end the more than a century long supremacy of the cutter bar. This cyclomaaier had a very high capacity and also enabled farmers to mow grass crops that would have been difficult to harvest with the conventional machinery. Together with the self-loader the cyclo-mower caused a real revolution in the field of forage production: in a very short time traditional hay making was completely replaced by silaging. In 1975, ten years after its introduction, there were 44,000 cyclo-mowers in the country. Source: Museum Historische Landbouwtechniek, Wageningen.

a new method of silaging which he improved with the help of advisory officers. When, subsequently, agricultural plastic sheeting and self-loaders became available the method – soon indicated as the ‘pre-wilting method’ – spread rapidly. Around 1965 most of the harvested grass was still being used for hay making and only one quarter was used for silaging. By 1975 the latter amounted to 50% and in 1985 to 75%.⁵⁰⁹

More or less parallel to the shift from ‘hay’ to ‘silage’ another innovation in roughage winning was introduced: the cyclomower. This piece of machinery, an invention by the Dutch constructor P.J. Zweegers that was introduced to the market in 1965, would push aside the more than a century old cutter bar in a short period of time. An important advantage of the cyclomower over the old cutter bar was that it could not get clogged up and also crops of grass that had before been difficult to mow – too wet, too short or too long – could be harvested easily now.

⁵⁰⁹ ‘Van tandwiel tot chip’, 1999, pp. 64-65.

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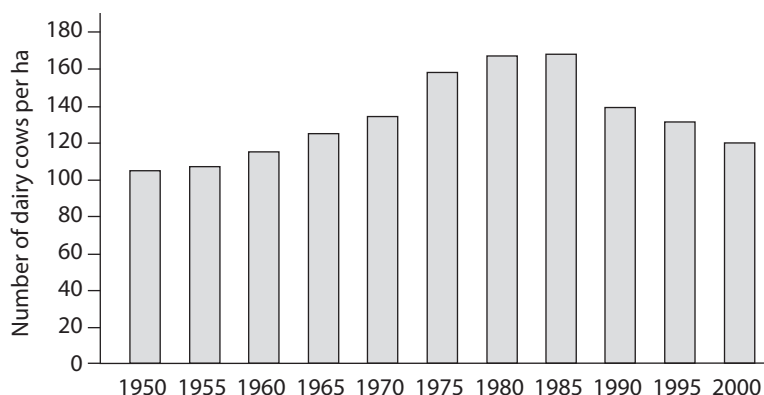


Figure 4.13. The number of dairy cows per 100 ha of grassland and fodder crops in the five sandy provinces¹, 1950-2000.

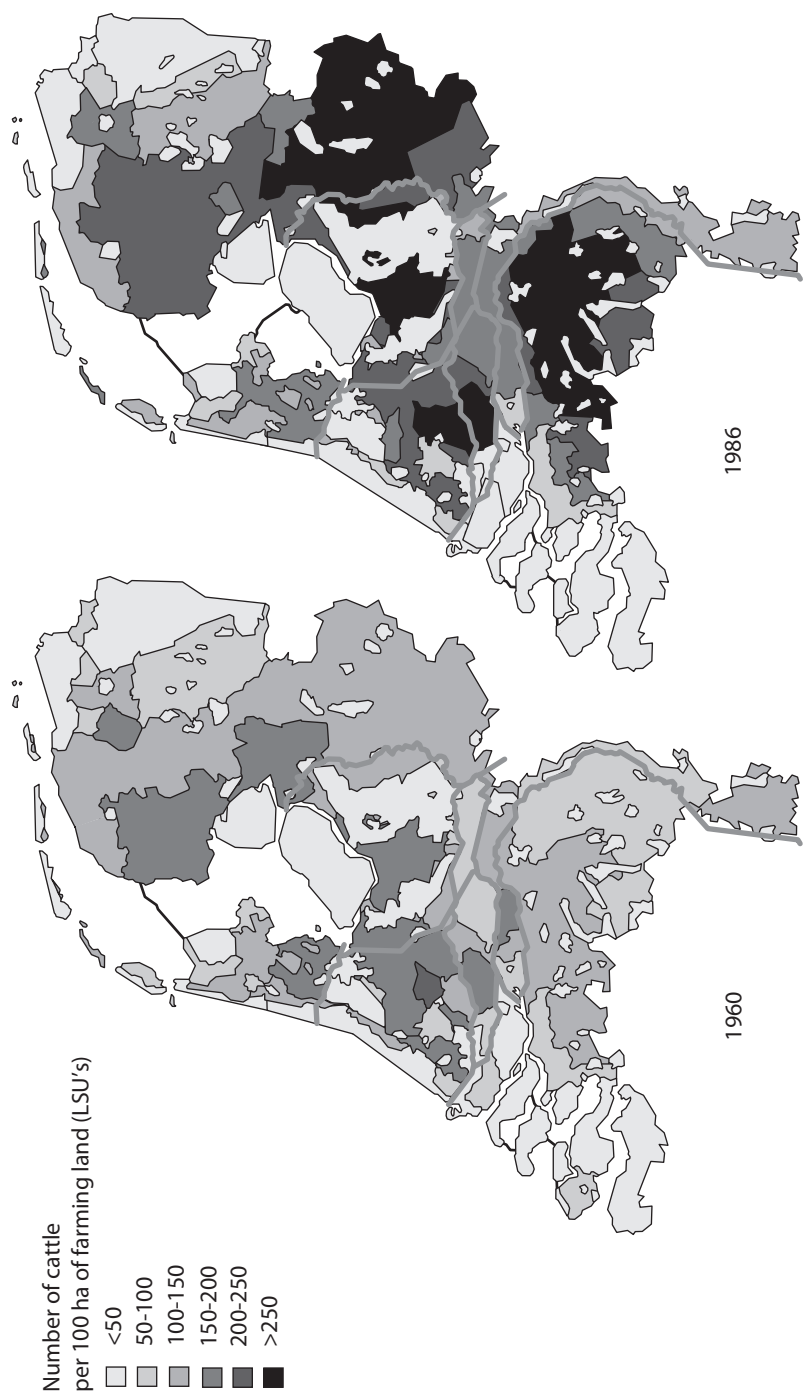
After: LEI/CBS, 'Landbouwcijfers'.

¹ Drenthe, Overijssel, Gelderland, Noord-Brabant and Limburg.

As the centre of gravity in dairy farming shifted from the 'traditional' livestock districts in Holland, Utrecht and Friesland to the sandy district, cattle density there increased rapidly, especially in provinces like Overijssel and Brabant. In those provinces it rose from respectively 108 and 117 dairy cows per 100 ha grassland and fodder crops in 1950 to 203 and 201 in 1984, the year the so-called *superheffing* or superlevy came into effect (Figure 4.13, Map 4.1).

This levy was an attempt by the European Commission to check the rapidly increasing surplus of milk and dairy products, the result of increasing productivity and production, also on an international scale. In 1979 the Commission had already put forward the idea of regulating the production of milk by establishing such a levy on milk production when it exceeded a certain threshold. The regularisation that came into effect in 1984 was indeed a watershed in dairy farming. It implied that the volume of milk a farmer was allowed to deliver – his 'quota' – was fixed to his production level in the years 1981-83. For virtually all farmers this meant that they had to reduce their production and once effective, the measure did indeed lead to a striking decrease. In practice, the quantity of milk a farmer could deliver was now fixed. To be able to reduce costs and maintain his income meant producing this quota with as few cows as possible. Now, efficiency in milk production had to be improved in this sense, which meant that breeding strategies were now concentrated on higher production, in relation to a lower weight of the cow and so a lower consumption of feed.⁵¹⁰ The overall result was that stocks were reduced considerably and by the year 2000 in the five sandy provinces the concentration of dairy cows was back to pre-1965 levels.

⁵¹⁰ Bieleman, 'De georganiseerde rundveeverbetering', pp. 151-152; Oldenbroek, 'De mogelijkheden van de Nederlandse rundveefokkerij', 1984.



Map 4.1. Cattle densities per 100 ha of farming land in 1960 and 1986. Farm enlargement, intensification and specialisation went along with a shift in the centres of gravity in dairy farming from the traditional livestock districts to the central and southern sandy districts. (Compare Map 2.5). After: Maas, Wijnen and Spiering, 'Landbouw', 1989, Figure 35a/b.



Meanwhile important – technical and organisational – changes had occurred in the field of cattle breeding as well. Since their arrival in the early 1920's the (local) breeding and bull societies that had been established all over the country, had to cope increasingly with venereal diseases like trichomoniasis, which led to infertility of the breeding cows of their members. It was a scourge that mainly hit small farmers, as they were particularly dependent on these societies. For that reason some veterinarians began to experiment with artificial insemination or AI around 1934 – in the depths of the Interbellum crisis. Their starting point was to try to stop the spread of these diseases by using AI. Shortly afterwards the first AI societies were established and as a result the numbers of infections was indeed reduced nationwide to virtually nil by 1956.⁵¹¹ That year, about half of all cattle farmers belonged to an AI society and around the mid-1980's 80% of all matings were carried out by means of AI. It should be said, however, that Dutch farmers were not leading the field. In countries like Denmark and England and Wales large numbers of cattle farmers had turned to AI much earlier.

In the initial phase the veterinarian aspects were indeed the most important. Soon, however, it appeared that from a breeding technological point of view AI also had important advantages. By applying AI high-quality breeding bulls became available to a much larger circle of farmers, and this was especially beneficial for smaller farmers who usually had no breeding bulls themselves. The small group of top breeders, however, were very much against the spread of AI at first. They saw artificial insemination as a direct and important threat to their commercial interest. Together with them the two herdbook organisations (the NRS and the FRS) were also fiercely opposed to it. So, remarkably, AI in the Netherlands was very much an innovation that spread from the bottom up, via a large number of small, locally organised cooperative societies.

From the late 1970's, the spread, and especially the internationalisation of AI took on a completely different dimension with the arrival of ET technology. ET or embryo transplantation had been developed in the Anglo-Saxon countries during the 1970's and the method implied that, with the help of a hormone dose, one high-grade cow could produce tens of calves per year instead of just one.⁵¹² Soon it became possible to freeze these embryos and in 1983 the first deep-freeze can with embryos of North-American black pied cattle arrived at Schiphol Amsterdam Airport.



Following the reorganisation of the Dutch Herdbook Society in 1906 a pure line breeding system had been chosen in which only animals of the same variety or breed were mated and the three new breeding directions were based on easily recognisable characteristics and defined and named as: (1) Black Pied Friesian-Holland breed (FH breed or, officially,

⁵¹¹ Van Adrichem Bogaert, 'De ontwikkeling', 1971, pp. 127 and 186.

⁵¹² This was realised by bringing the cow's fertilised egg cells from her into the uterus of other cows on heat.

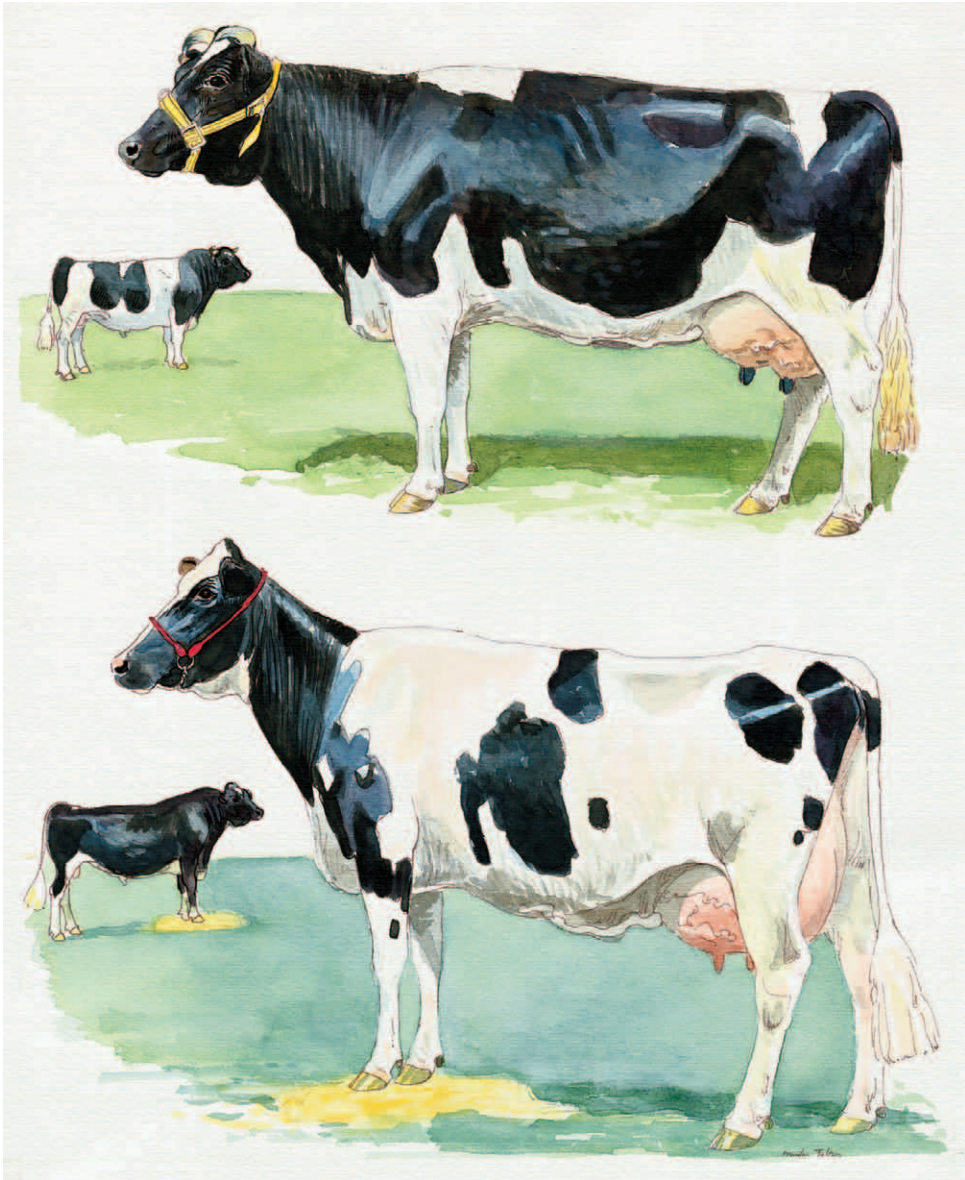


Illustration 4.8. Friesian-Dutch black and white and Holstein-Friesian breed.

By the end of the 1970's the familiar Friesian-Dutch black and white dairy cattle breed (at the top) was rapidly replaced by the Holstein-Friesian breed (at the bottom). Originally bred as a pure milker, American breeders had paid little attention to its meatiness. The arrival of the Holsteins – some scornfully called them 'walking hat stands' – caused a lot of commotion in the world of traditional cattle breeders in the country. These water colours were created by Marleen Felius, a world famous painter of cattle and an internationally acknowledged expert in the field of cattle breeding. Source: © Marleen Felius, Fries Zwartbont and Holstein-Friesian, c/o Pictoright, Amsterdam 2009.

H-breed), (2) White-faced Black Groningen breed (G breed) and (3) Red Pied Maas-Rijn en IJssel breed (MRIJ breed).⁵¹³ It was a breeding method that was strongly focused on the exterior of the cow. Breeders concentrated on obtaining a type of cattle that was a good milking type producing milk with a high fat content as well as a meaty cow. Experts talked about a *dubbel-doel type*, a dual purpose type of cow. However, by the early 1960's, it was clear that due to this rather one-sided orientation based on exterior breeding, the increase in productivity had begun to stagnate. As other problems turned up, cattle breeding in the Netherlands inevitably became deadlocked.

Furthermore, as the milking machines had spread, it became clear that to make machine milking more efficient a new type of milking cow was needed that had other qualities, for instance, a good 'ease of milk'. Moreover experts propagated the idea that in the long term the protein content of milk (being the basic component for cheese) would be economically much more important than the fat content (being the basic component for butter). Cheese promised to be the important future product in dairy farming, while butter would lose its importance.

So, there was an urgent question as to how to implement the new breeding goals rapidly and efficiently. It led – eventually and in steps – to the introduction of the so-called 'waiting bull system' in the 1970's. The crucial guideline in this new breeding system was the idea that selecting via the bulls would be much more efficient than a selection via the female line. The revolutionary thing about the new breeding system was the fact that the genetic value of a breeding bull was no longer determined on the basis of the qualities of its dam and its ancestors in general, but on the basis of the qualities of his female descendants, its daughters!⁵¹⁴ A young breeding bull had to wait before he – or rather his sperm – was used on an extensive scale, until it appeared that his first descendants met the newly formulated demands. To make this approach practicable, a fully computerised, central control of the production performances of all dairy cows was set up.⁵¹⁵

Meanwhile, exports of breeding cattle were at risk as dairy farmers in other European countries began to import increasing numbers of a new and completely different American breed of dairy cow. And some Dutch breeders began to wonder if this American breed, called Holstein-Frisian (or HF for short), would reach the newly formulated breeding goals better than the traditional Dutch breeds did. The question was whether these breeds could improve the milking qualities of the 'national' breeds, i.e. not only the milk yield but also a number of functional qualities to make them more suitable for automated machine milking. Yet, it would take until the end of the 1970's before a transfer to this new type of cattle got going. The three Dutch breeds not only lost their dual-purpose character, but also their characteristic markings and their exterior.



⁵¹³ Stapel, 'Rundveefokkerij', 1988; Felijs, 'Cattle breeds', 1995.

⁵¹⁴ De Jong, 'Veehouderij', 1979, pp. 211ff.; Van den Berg, *et al.*, 'Veehouderij', 1986, pp. 155ff.; Groen *et al.*, 'Stijlvol fokken', pp. 8ff.

⁵¹⁵ Van Adrichem Bogaert, 'De ontwikkeling', 1971, pp. 113ff.

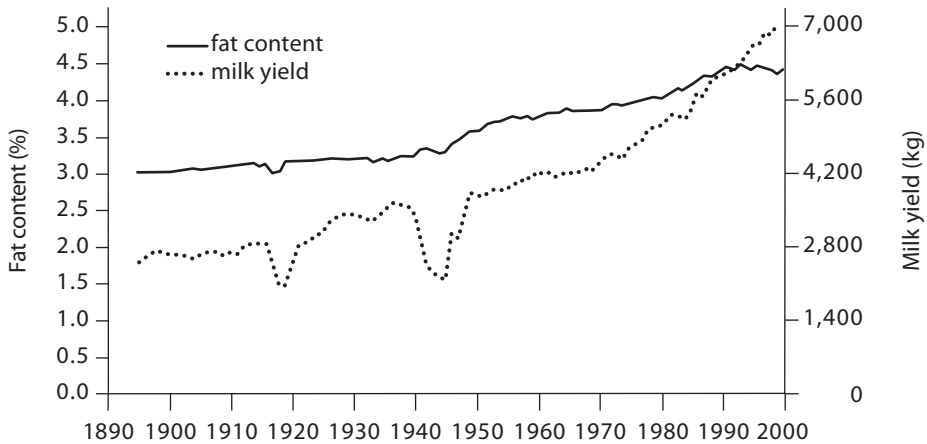


Figure 4.14. The average annual milk yield in kilograms per dairy cow and the fat content in %, 1895-2000. The yields during the war years are according to the official state statistics. In reality they may have been quite a bit higher. After: Knibbe, 'Agriculture in the Netherlands', 1993, Table 3.15; LEI/CBS, 'Landbouwcijfers'.

Table 4.10. The annual average milk yield and fat content of Dutch dairy cows 1895-2000, in kg per year.

	Milk yield in kg/year	Fat content in %
1896-1905	2,628	3.01
1931-40	3,441	3.19
1951-60	3,944	3.71
1991-2000	6,629	4.41

Source: 'Verslagen van de landbouw'; LEI/CBS, 'Landbouwcijfers'.

A comprehensive complex of innovations and improvements indeed caused a spectacular increase in productivity. In the early 20th century the average Dutch dairy cow produced 2,628 kg milk per year (with a fat content of 3.1%). During the 1950's the average milk yield had increased to 3,944 kg per year (with a fat content of 3.71%). And although milk yields only made a little progress during the 1960's they increased again afterwards to as much as 6,629 kg (with a fat content of 4.41%) during the last decade of the 20th century (Figure 4.14; Table 4.10). Some individual cows even produced milk yields of 8,000 kg per year or more. Even more important in terms of labour productivity was the fact that since the 1950's

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labour demand in dairy farming had been reduced from approx. 330 man-hours to approx. 45 man-hours per cow per year.⁵¹⁶ Dairy farmers had achieved this thanks to substantial investments in implements, machinery and stables and, of course, the improvement of their cattle breeds.

By the end of the 20th century the social landscape in livestock farming looked completely different from the one in the early 1950's as the spectacular, technological developments in dairy farming had come along with radical changes in its structure. The results of the first national livestock census held in 1910 show that there were a little more than 190,000 dairy farmers in the Netherlands and thereafter their numbers increased to almost 203,000 in the early 1950's (Table 4.11). Ever since then, however, their numbers dropped dramatically and in the year 2000 there were only 29,467 left or 14% of the number less than 5 decades earlier. And while in the 1950's most dairy farmers had fewer than 10 dairy cows – they

Table 4.11. Farm size structure in Dutch dairy farming in 1910, 1953 and 2000.

1910			1953			2000			
Number of dairy cows per farm	Number of farms		Number of dairy cows per farm	Number of farms		Number of dairy cows per farm	Number of farms		
	abs.	in %		abs.	in %		abs.	in %	
1-5	137,162	71	1-5	107,129	53	1-9	1,932	7	
6-10	30,767	16	6-9	46,629	23				
11-20	15,265	8	10-19	34,138	17	10-19	1,929	7	
21-50	9,264	5	20-49	14,676	7	20-29	2,994	10	
						30-49	8,572	29	
51-100	132	0	≥50	215	0	50-99	12,208	41	
≥ 100	10	0				≥100	1,832	6	
Total	192,600	100	Total	202,787	100	Total	29,467	100	
Average number of dairy cows per farm			5.5		Average number of dairy cows per farm	7.4		Average number of dairy cows per farm	51.0

Source: Bieleman, 'De georganiseerde rundveeverbetering', 2000, p. 150.

formed more than three quarters of the total number – they had virtually ceased to exist by the end of the 20th century. Then most dairy farmers had at least 50 dairy cows; forming 47% of their total number.

⁵¹⁶ 'Om u te dienen', s.a., p. 88.

4.3. Livestock farming

Table 4.12. The average annual production value¹ in the different sub-sectors in livestock farming in the Netherlands in the years 1994-97, in million guilders².

	Average production value**	
	in guilders.	in %
Dairy farming	10,865	57.2
Pig farming	5,314	27.9
Poultry keeping	2,364	12.5
Sheep- and goat keeping	164	0.9
Horse keeping	26	0.1
Others	262	1.4
Total	18,995	100.0

Source: LEI/CBS, 'Landbouwcijfers'.

¹ The total average production value in agriculture and horticulture amounted to 35,411 million guilders.

² Minus internal deliveries.

By the mid-1990's about half of the gross production in Dutch agriculture and horticulture was produced by the livestock farming sector (Table 4.12). Dairy farming by itself contributed about 10,900 million guilders, i.e. 57.2% of the total value of the livestock production, or almost one third of the gross production value in agriculture and horticulture.

4.4. Horticulture

During the war years vegetable and fruit cultivation had been expanded considerably because of the high prices and a growing outlet to Germany. The cultivation of bulbs and flowers, however, had been reduced drastically at the same time. Especially in the last year of the war the sector had suffered from a lack of fuel for the heating of the greenhouses and much damage was caused by inundation, evacuations and the destruction of glass. The area of



Illustration 4.9. The vegetable auction in Broek op Langedijk (Noord-Holland) in 1964.

The auction clock, introduced at the beginning of the 20th century, provided a very efficient way of selling, which became known as Dutch auctioning. The clock starts at the highest price a supplier demands and turns back in price until a buyer is willing to pay. The first and highest bid wins. By the year 2000 this system was no longer in use in the glass-vegetable culture; only in the cut flower business was it still commonly used. Source: Collection Spaarnestad Photo: W.L. Stuijbergen.

glass that was destroyed by wartime activities was about 2½ million m². But although glass was only in very limited supply, the sector recovered remarkably quickly. In the first years after the war horticultural products, bulbs in particular, were amongst the most important export commodities.

After 1950 Germany rapidly became the leading export destination. The share of these exports to our eastern neighbours increased to more than 70% of the total horticultural exports during the second half of the 1970's. Since then, however, important shifts occurred. For a number of reasons export opportunities to Britain and France improved significantly while the share of the German market fell back to 51% in the mid-1980's. The share of a number of less important customers like Sweden and Switzerland was also supplemented with countries like Denmark and Ireland. Subsequently new markets in the Arabic world, in the US and in Canada were opened as well. Leading crops became tomatoes, lettuce and cucumbers, which developed into year-round products breaking the usual winter stillness.

International interest in new products was increasing and led to the introduction of year-round radish, peppers, aubergine, meat tomatoes and many other, smaller products, during the 1970's and 1980's. Conversely, however, the increasing prosperity of the European consumer negatively affected the demand for the traditional high-calorie, coarse vegetables like headed cabbage, beetroot, and others. These products played a decreasing role in the export range. On the other hand, it appeared that the market was still interested in finer, open-ground products like Brussels sprouts, witloof, chicory and leek. At the same time, the horticultural sector became rather successful in introducing new vegetables like Chinese cabbage, tuber fennel, iceberg lettuce and others.

For fruit growers the rising demand for apples and pears promised new prospects, yet fruit exporting countries like Italy and France soon pushed aside the Dutch products, although new varieties like the Jonagold and Elstar apples offered new and promising opportunities for the Dutch fruit growers.

Crucial was the shift in the sales structure from small-scale retailers and street trading to large-scale supermarkets from the 1960's onwards. The standardised, uniform product Dutch horticulturists were used to producing fitted perfectly well into the mass distribution systems that emerged thereafter. The arrival of the chain store business led to an increase in the number of sales outlets, which meant in fact a deeper penetration in the market and consequently a rise in sales. However, at the same time the trend met with a lot of criticism from horticulturists as well as consumers. It was estimated that the market share of chain store business in the sale of vegetables amounted to as much as 50% in the Netherlands around the mid-1980's – about the same as in the neighbouring countries. As for the sector's most important export product – tomatoes – about 70% of the total production was sold in supermarkets. Almost two thirds (62%) of mushrooms – a relatively new product – were sold in supermarkets in the 1990's.⁵¹⁷ Yet, this development met with due criticism and opposition from consumers and producers.

⁵¹⁷ Van Horen (ed.), 'Sporen naar de toekomst', 1997, p. 33.

Outdoor production of vegetables was able to maintain its position during the second half of the 20th century (Table 4.13). The cultivation of outdoor fruits however was reduced drastically. Around 1950 the area under outdoor fruits had covered about 66,000 ha; five decades later on there were barely 20,000 ha left.

The flower bulb culture as well as nursery stock grew more important and strikingly the former shifted to a large extent from the traditional centres in the dune district and Westfriesland to regions elsewhere in the country, like for instance the Noordoostpolder. The area under bulbs increased from about 6,500 ha in 1950 to 22,500 ha. However, the importance of the horticultural seed industry, traditionally a very important sector, declined. The area under seeds decreased from almost 6,600 ha in 1955 to hardly 1,000 ha by the year 2000.

Table 4.13. The area of horticultural crops per group of crops in hectare, in 1950, 1960, 1975 and 2000.

	1950	1960	1975	2000
Vegetables				
open ground	36,542	40,644	53,648	42,067
under glass	2,221	4,017	4,683	4,200
Fruits				
open ground	65,928	57,224	31,892	20,606
under glass	786	468	117	30
Floricultural crops				
open ground	870	980	1,059	2,552
under glass	283	497	3,060	5,927
Flower bulbs	6,509	10,416	13,010	22,543
Nursery stock	3,086	2,957	5,089	13,010
Horticultural seed crops	5,232	3,947	2,089	1,023
Mushrooms	-	-	70	95
Total	121,457	121,150	114,717	112,053

Source: LEI/CBS, 'Landbouwcijfers'.



A new phenomenon in Dutch horticulture was mushroom production (*champignonenteelt*). Old mushrooms used to be grown on a small scale, especially in the caverns of the Sint-Pietersberg, near the town of Maastricht. However, it was not until the end of the 1950's that production became more commercialised. After an initial and somewhat hesitant

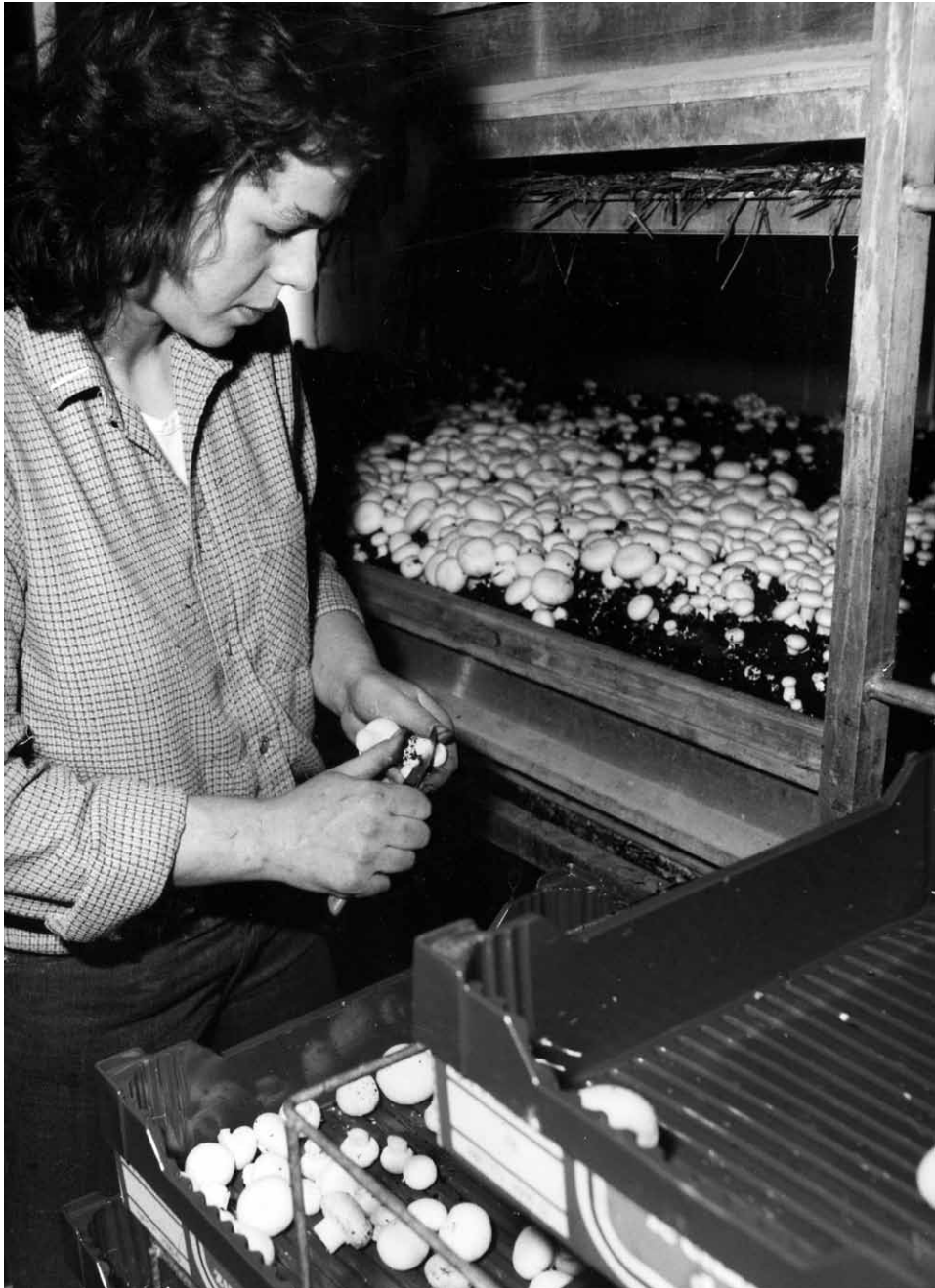


Illustration 4.10. Manual harvesting of mushrooms.

During the 1970's, when mushroom growers were compelled to reduce their production costs, they learned how to mechanise the harvesting of mushrooms destined for the canning industry. The harvesting of mushrooms for fresh consumption, however, was still done by hand. Source: Museum de Locht, Melderslo-Horst.

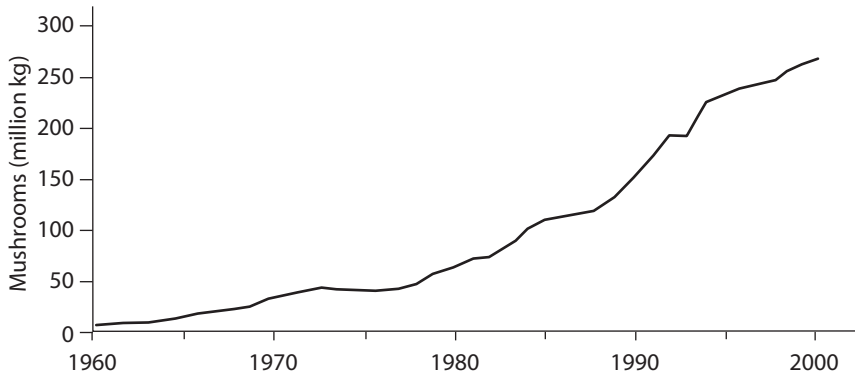


Figure 4.15. The production of mushrooms in the Netherlands in million kilograms, 1960-2000. After: LEI/CBS, 'Landbouwcijfers'.

start and after a period of stagnation and even decline during the 1970's, production then increased rapidly (Figure 4.15). Quite a number of farmers that had earned a living in livestock farming, shifted to mushroom production, when this sector was faced with all kinds of restrictive government regulations from the mid-1980's onwards.⁵¹⁸

An important and stimulating factor in the spread of mushroom cultivation was the establishment of a Research Station for Mushroom Cultivation (*Proefstation voor de Champignoncultuur*) in the small town of Horst in Northern-Limburg, in 1957. This research station was not only important because of its research into the scientific backgrounds of the crop and its culture. It also played a role in the dissemination of knowledge and experiences among beginning growers. In 1963 a vocational school was established as a part of this research station.⁵¹⁹

Traditionally, mushrooms were grown on a substrate made by the growers by hand from horse manure. In time, they learned to add all kinds of other material to it, like for instance gypsum. This mixture, *compost*, was then intermingled with brood (a pure culture of mycelium on grains of corn) and brought into the nursery beds. Until 1964 each mushroom grower made its own compost on its own farm. Then, however, the Cooperative Manure Fermentation Plant started, an initiative of the Mushroom Growers Society (*Coöperatieve Nederlandse Champignonskwekersvereniging* or CNC) that had been established in 1953 by a group of young mushroom growers.

Mushrooms do not grow continually, they appear in weekly 'flushes' and after three to five weeks, yields drop off while the risk of disease increases and for that reason the cycle is brought to an end. In the early years yields amounted to about 3 to 7 kg mushrooms per m² and the growing cycle lasted for about 10 to 12 weeks. In the 1990's productivity had

⁵¹⁸ Keulen, 'Visie op champignonteelt', 1986, p. 6.

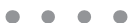
⁵¹⁹ Schaper, 'Van Houthem naar Horst', 1992.

increased to 25-30 kg/m², in 3 to 5 weeks, while the number of cycles per year had also increased.⁵²⁰

The price of mushrooms was subject to strong fluctuations and for that reason initiatives were developed to process them into canned food to effect a price floor. Thus, a mushroom canning industry came into being which boomed in the early 1980's in particular. Around the mid-1990's there were about 7 plants active.⁵²¹ Together they processed two thirds of the total mushroom production, and most of it was exported, mainly to Germany.

However, in the early 1970's dump imports from China all of a sudden caused mushroom growers great problems as prices fell dramatically. Although the EU tried to protect the home market by restricting the imports of Chinese mushrooms, this did not stop a further decline in price. Many growers saw no other option than to stop. Those who carried on knew that they had to curb their costs and they did so by mechanising parts of the cultivation progress. So, for instance, a machine was introduced to pick the mushrooms that were intended for the canning industry. The picking of mushrooms for fresh consumption, however, remained a manual job.

In the early 1950 there were about 50 mushroom farms in the Netherlands. Twenty years later there were about 1,100, half of them in the province of Limburg. The malaise in the 1970's caused their numbers to fall to little more than 500 by the year 2000, although the area under cultivation still increased substantially. The total production that had stuck to a level of some 40 million kg in the 1970's grew explosively thereafter to more than 250 million kg in the late-1990's.⁵²²



Greenhouse horticulture was beyond any doubt the most dynamic and innovative sector in Dutch market gardening, maybe even in Dutch agriculture and horticulture as a whole (Box 4.1). The growing of crops under glass to force the growth so growers could benefit from higher prices, had spread already as early as the 17th century at first in hotbeds with oiled paper or flat glass, so-called Dutch lights (*plat glas*), if necessary 'heated' with the help of horse manure.⁵²³ Glasshouses (*staand glas*) came into fashion around 1890, when in the Westland district following the Belgian example the first grape houses (*druivenserres*) were constructed.

In 1950 Dutch horticulture had 2,330 ha with glasshouses and 921 ha of Dutch lights. Later the area under glasshouses expanded rapidly and continuously, while Dutch lights had virtually disappeared by 1970 (Figure 4.16). The shift from Dutch lights to glasshouses not only meant an improvement in the working conditions for the gardeners, but also resulted in a higher labour productivity.

⁵²⁰ Soberjé, 'We hajje niks, ma we zie good geëindigd', 1992, p. 297; Van Horen (ed.), 'Sporen naar de toekomst', 1997, p. 21.

⁵²¹ Van Dril, 'Sectorstudie groenten- en fruitverwerkende industrie', 1996, annex A.

⁵²² Damen, 'De champignonsteelt', 1970, p. 8; LEI/CBS, 'Landbouwcijfers'.

⁵²³ Manure of horses has the property to develop a lot of heat as it is decaying.

Box 4.1. The development of a greenhouse vegetable enterprise in the Zuid-Holland greenhouse district, in the period 1950-2000.

1950	The grower returned from military service in Indonesia, eager to earn a living as a vegetable grower. He started with 2,000 m ² of hotbeds (removable frames of 75 by 150 cm). Cropping pattern: lettuce in spring, cucumbers in summer.
1956	Construction of 1,000 m ² of greenhouse. Financial support from the Ministry of Agriculture's credit guarantee fund.
1957	Cropping pattern in greenhouse: lettuce in spring, tomatoes in summer. High prices for tomatoes. Sufficient profit to repay the 1956 loan.
1958	Construction of 2,500 m ² of greenhouse, including heating system. Cropping pattern: lettuce in spring, tomatoes in summer, lettuce in autumn.
1973	Greenhouse area expanded to 10,000 m ² , switch to heating with natural gas. Cropping pattern: tomatoes in spring and summer, lettuce in autumn.
1980	First application of climate control computer in the greenhouse.
1984	Greenhouse area expanded to 30,000 m ² , switch to artificial substrate. Cropping pattern: tomatoes year round (December-October).
1985	Yield level: 40 kg/m ² .
1988	Switch to high-wire system in tomato production. First application of CO ₂ fertilisation in the greenhouse.
1997	Grading of tomatoes contracted out to packing station. Focus on crop production and harvesting only.
1998	Yield level: 60 kg/m ² .
2000	Three locations with a total production area of 130,000 m ² . Management by the retired grower's two sons.
2000-present	Bringing together the production at one completely new location.

(Source: Buurma, 'Dutch agricultural development', 2001).

The increase in the area of glasshouses as well as the introduction of all kinds of technical innovations went along with the spread of a new type of glasshouse, the *Venlo-kas* (the Venlo glasshouse). This type of greenhouse had already been introduced in 1957, and was named after the town of Venlo, a traditional horticultural centre in the north of the province of Limburg. Being cheap to build, this type of glasshouse had also a high translucency in comparison with older types of greenhouses and it was perfectly appropriate for heated crops of vegetables as well as flowers. By the end of the 1980's 83% of Dutch greenhouses were Venlo glasshouses.

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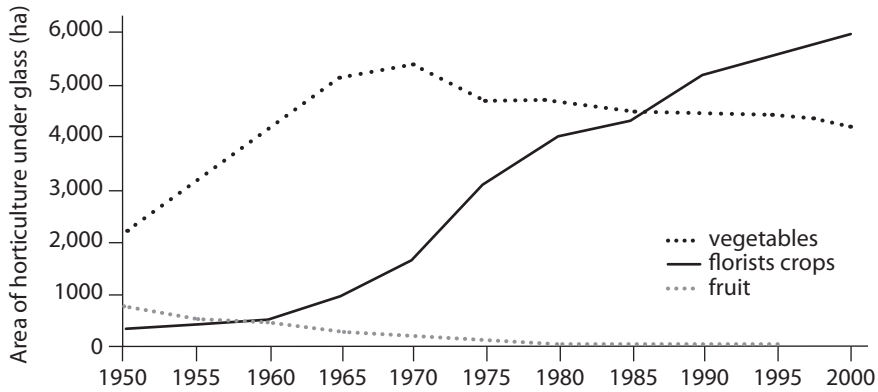


Figure 4.16. The area of horticulture under glass per group of crops in hectares (5-yearly figures), 1950-2000. After: LEI/CBS, 'Landbouwcijfers'.



Illustration 4.11. A greenhouse complex in eastern Drenthe photographed from above.

The greenhouse horticultural sector was without a doubt the fastest growing sector in the whole of Dutch agriculture and horticulture after World War II. At first the growth took place in the old, traditional centres like the Westland district (south of Den Haag and nicknamed the *glazen stad* – glass city). Recently, however, the Dutch government designated some new areas (as shown here near the village of Erica in the municipality of Emmen in the eastern part of Drenthe) to be developed. Horticulturists that established themselves in these new centres had an ultramodern infrastructure and state-of-the-art technology at their disposal, enabling them to produce in a sustainable way. Photo: Jan Anninga.

Another important innovation in hot house horticulture occurred in heating systems. Around 1950 the great majority of the glasshouses were heated with coal. Thereafter many market gardeners changed over to fuel oil. A much greater impact than this, however, was brought about by the arrival of natural gas, ever since the mid-1960's. The first glasshouses heated with natural gas were constructed in 1964 in the Glasshouse Crops Research and Experiment Station at Naaldwijk (Zuid-Holland). The introduction of natural gas not only went along with all kinds of technical innovations, it also caused gardeners to shift from unheated greenhouses to heated greenhouses. At the end of the 1990's virtually the whole area of greenhouses were indeed heated greenhouses.

And, of course, productivity rose as a result. Plant breeders developed new varieties, adapted to what was needed in terms of a more rationalised system of management. In tomato cultivation for instance, physical yields increased from 8 kg/m² in 1954 to 15 kg/m² in 1975 and to 47 kg/m² in 1996.⁵²⁴

The use of natural gas instead of coal or oil saved the gardeners not only a lot of work, it also brought the production of high-quality CO₂ within reach – that is to say not polluted with flue gases. For a long time gardeners had been familiar with the effect of 'CO₂ application' boosting the yields of their crops and improved their qualities. However, it had still not been applied in their daily gardening practice. Now, as natural gas for heating spread, they could raise the CO₂ content of their greenhouses quite easily by burning natural gas. Soon CO₂ application became widely accepted in the whole greenhouse sector, including in floriculture.⁵²⁵

In 1976 3 billion m³ of natural gas was used by the sector, about 6% of the interior consumption but as the price of oil went up the price of gas also increased substantially. By the early 1970's the price had been about 6 cents/m³, in 1978 it had already increased to 16.5 cents. But the worst was yet to come, as in 1984 the price had gone up to as much as 45 cents. In some cultures the energy costs represented 50% of the total expenditures. In those days the cry of distress was heard: 'Gas price up, horticulture rack and ruin' (*Gasprijs omhoog, tuinbouw ten onder*). For some years the use of gas fell, but it soon increased again. In 1992 the national government made a *MeerJarenAfspraak-Energie* or MJA-E (Long Term Agreement – Energy) with the sector within the framework of its energy saving policy. Yet, this could not prevent the consumption of gas and electricity from increasing as an effect of the ongoing process of increasing intensification in glasshouse cultivation.

As the price of natural gas rose⁵²⁶ the need for a more efficient and refined heating technology became ever more urgent. Many technological innovations in the field of energy saving were realised in close cooperation with the authorities, the banking business, the ancillary industry, and of course the glasshouse constructors. However, in spite of all the efforts to bring down the costs of energy they amounted to as much as 16% of all costs in

⁵²⁴ Buurma, 'Dutch agricultural development', 2001, p. 19.

⁵²⁵ Van Doesburg *et al.* (eds.), 'Honderd jaar praktijkonderzoek', 1999, pp. 81, 105-108, 120.

⁵²⁶ Between 1973 and 1984 they rose from 66.51 to 449.68 gld/1000 m³; LEI/CBS, 'Landbouwcijfers'.

floriculture and in the glass vegetable culture even as much as 20% by the end of the 20th century.⁵²⁷

As all kinds of new technologies changed horticulture, it became more and more of an industrial production process and some began to speak in terms of 'green industries'. This was especially so in the case of hydroponic cultivation. In the early 1970's Dutch advisory officers and horticultural experts had become acquainted with the use of rockwool as a substratum in Denmark and shortly afterwards – in 1975 – some gardeners began experiments to grow cucumbers on substratum.⁵²⁸ From then on the use of this material rapidly spread. In 1995 about three quarters of all glass vegetables (like tomatoes, cucumbers and aubergines) were no longer grown in the ground but on rockwool. In floriculture (roses and orchids) this share was as much as a quarter.⁵²⁹ Hydroponic cultivation had many advantages. One of them – and maybe the most important – was probably that a grower could adjust temperature, moisture and fertilisers according to the exact requirements of the crop. Another – environmental – advantage was the fact that soil disinfection was no longer necessary. A disadvantage, however, was that the production of rockwool itself required a lot of energy.

Another innovation that spread rapidly from the early 1990's onwards was the use of artificial light, as a supplement to sunlight in the growing of pot plants and cut flowers, especially roses. More light stimulated the growth of the plants and improved their quality; they became visibly stronger and more beautiful as the plants assimilated longer per twenty-four hours. Experts talked about assimilation lighting and it enabled growers to provide their customers with products of a constant and high quality the year round. The problem, however, was that lighted greenhouses soon became one of the main sources of light pollution that disrupted the day and night rhythm of nature in their surroundings.

A growing tension between productivity growth and the environment that became ever more apparent in the 1980's and 1990's, led to a covenant between the government and the sector. This agreement was aimed at curbing the use of crop protection chemicals, fertilisers and CO₂, besides a more efficient use of energy and the use of sustainable energy, in 1997. At the same time, authorities took steps that had to lead to the improvement of the infrastructure and the construction of new greenhouse areas to be developed outside the traditional centres (in particular the Westland district), in conformance with modern standards.

Meanwhile, in connection with the increase in the area of greenhouses and all the technological innovations linked to it, a shift had taken place in the area of crops. When in 1992 the area under glass in Dutch horticulture passed the 10,000 ha mark, about 4,590 ha (or 45%) was covered with vegetables, 5,344 ha (53%) with flowers, 168 ha (2%) with nursery stock and another 38 ha with fruit (Table 3.18). The importance of the latter had already decreased since the early 1950's. Back then it consisted mainly of the famous Westland grapes, which before the war had covered an area of almost 800 ha.

⁵²⁷ Van Doesburg *et al.* (eds.), 'Honderd jaar praktijkonderzoek', 1999, pp. 81, 105-108, 120.

⁵²⁸ *Ibidem*, pp. 81, 121-123.

⁵²⁹ Bakker *et al.*, 'Intensivering in de glastuinbouw', 1998, p. 19.

Ever since the origination of tomato cultivation – since the early 1920's – this crop had dominated glass culture together with cucumbers right into the 1960's. The area of vegetables under glass reached its peak in 1970 when it covered more than 5,300 ha. Since then, however, lettuce cultivation decreased due to falling prices. Many growers switched to new products like peppers, aubergines and radish. For the rest, the remarkable expansion of the area under glass went along with a similar sensational growth in floriculture. Many flowers were sold on the West German market thanks to a perfectly organised distribution system. Very successful in particular were the so-called *lijnrijders*, merchants who went to Germany with their lorries and drove along a certain fixed route to deliver their flowers to their customers, the flower retailers, two of three times a week.⁵³⁰

Consequently the floriculture sector developed into the leading and most dynamic sector of Dutch horticulture since the 1960's. From 1965 onwards the cut flower area expanded very rapidly from 750 to 3,250 ha; from 1980 onwards the growth rate declined somewhat to stabilise at a level of 4,000 ha. On the other hand, the pot plant sector went on expanding, to reach 1,750 ha in 2000; this trend of pot plants having an increasing part in floriculture also requires intensification.⁵³¹

In the 1990's, however, competition from countries like Israel, Kenya and Colombia caused a lot of trouble. Flowers from these countries were partly sold via the Dutch auction and their quality was better than the Dutch product, especially during the winter period.



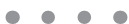
Besides all kinds of technical innovations a far-reaching process of specialisation occurred in Dutch glass culture. Initially, most Dutch horticulturists produced several different vegetables at the same time, flowers and/or fruits and they did so partly under glass, as well as partly in open ground. However, by the 1980's specialised glass cultivation had appeared. These horticulturists produced only one crop, or at most one crop group, for instance flowering pot plants. In addition, there was the emergence of specialised nursing firms. In the 1960's the raising of vegetable planting material (like lettuce, endive, tomatoes, cucumbers, etc.) by horticulturists themselves was still a regular occurrence. Shortly afterwards, however, these activities had been transferred from the growers to specialised raising firms. And in general, glasshouse firms increasingly became enterprises that were highly dependent on a series of other, ancillary industries.

The more traditional sectors in horticulture were also changing as growers sought for ways to cut costs and improve labour productivity of their business. And as in arable farming plant breeding contributed considerably to that. This discipline provided new varieties of plants that were adapted to a more rational gardening practice. A good example is the improvement of Brussels sprouts varieties. Around the mid-1960's a grower growing sprouts still had to go through his crop several times consecutively to harvest the mature ones. Less than twenty years later varieties of sprouts were much more uniform, especially in ripening.

⁵³⁰ Plantenberg, '100 jaar veilingen', 1987, pp. 106-108; Vijverberg, 'Glastuinbouw in ontwikkeling', 1996, p. 86.

⁵³¹ Buurma, 'Dutch agricultural development', 2001, p. 17.

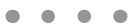
This allowed growers to mechanise the harvest and harvest their sprouts in just one go. That saved the grower a lot of labour as well as cold hands! Another example is onion culture in the south-western marine clay region. Traditionally, onion cultivation involved a lot of labour due to the control of weeds that was done manually. In the early 1950's one hectare of onions demanded about 600 man-hours, to a large extent because of the weeding of the crop. In the mid-1970's it was possible to cut back the labour demand of the crop to 50 man-hours per hectare thanks to the use of herbicides, making the culture profitable again.



In the course of time some sectors in Dutch horticulture had developed into real bulk consumers of crop protection compounds. In the mid-1980's all these sectors together were responsible for more than one quarter of the total consumption of pesticides in the Netherlands, amounting to more than 20 million kg.⁵³² A major part of it came from the flower bulb sector.

Meanwhile attempts were made to reduce the use of these agents by developing biological control methods. Already before the war some growers had fought plagues in their greenhouses by making use of their natural enemies. Yet, the arrival of modern chemical and cheap pesticides meant that this approach as well as scientific research to develop it had come to a dead end.⁵³³ Soon, however, when it became clear that certain plague organisms were developing a certain tolerance to these chemical compounds and after this problem of tolerance worsened in the 1960's, new biological methods were developed against a number of plagues in fruit farming as well as in glass vegetable growing. In fruit farming, especially, a lot of spraying had been done and apart from the generally acknowledged harmful environmental effects, tolerance problems had arisen with some specific diseases.

The first biological control method that was developed against plague organisms in the greenhouse horticulture was the spinning mite. This mite was not only a plague to virtually all crops under glass, but for some open ground cultures as well. And again it was tolerance problems that initiated the search for an alternative to the chemical control method. The same went for another kind of plague, the white fly. After a private company had developed a biological method to fight these organisms in the early 1970's, this approach spread rapidly. In 1968 the biological approach had been practiced on only 9 ha; less than two decades later it was applied worldwide and in about twenty countries on more than 3,000 ha.



Important for the cost-effectiveness in greenhouse horticulture was the improvement of the infrastructure, by means of land consolidation and land reconstruction projects. Without a doubt, the most striking example of this was the land consolidation project 'Geestmerambacht' in the north of the province of Noord-Holland. The 'Geestmerambacht' was a polder of about 5,800 ha, a region that was nicknamed *het rijk van de duizend eilanden*

⁵³² Oskam *et al.*, 'Pesticide use', 1992, p. 11.

⁵³³ Bieleman, 'Gewasbescherming', 2000, pp. 220-221.

(‘the realm of a thousand islands’). This name in fact identified the greatest problem for this region that was known for being one of the most important horticultural districts of earlier times. It was renowned especially for its cabbage culture in open ground. Virtually all of the horticultural land was spread around over countless, often very small plots of land on islands, separated from each other by ditches broad and narrow. The holdings were small – an average of only 3 ha – and their lands were spread over many small plots at a distance of sometimes a number of kilometres from the central village. Ten to twenty plots per farm was not exceptional and some farms had more than 70 plots (that is to say: islands) and these were only accessible by boat! Already in the 1930’s the impracticability of this situation had become poignantly clear. Yet, the high costs stood in the way of improving this situation. Finally, in 1962, and under pressure from the ‘green front’ the central government decided to get things going anyway. The plan that was presented in 1964 consisted of the transformation of the region from a clear-cut waterway land division into a polder with roads. The works began in 1968 as a new pumping station was taken into service, followed by a much comprehensive complex of various activities which led to a major metamorphosis of the area.

In 1948 the polder still counted almost 1,200 horticulturists and on the eve of the start of the project there were only 646 left; which was characteristic for the need of this region. These horticulturists together held no less than 5,546 plots, with an average size of only 0.4 ha. After the project had been finished, in 1979, there were 290 of them left that had 442 plots of an average size of 4.1 ha. The average number of plots per farm had been reduced from 8.6 to 1.5. Of the 104 dairy farmers the area had had on the eve of the project, 75 remained. The average number of plots of these farms was reduced from 21.4 to only 1.7. In total 120 new farms were being built in the re-allotted area. Moreover, the accessibility had improved beyond comparison. In figures: the length of the metalled road scheme had increased from 9 meter to 23 meter per ha of the cultivated land.

In another horticultural district, the famous Westland district, south of Den Haag, there was also a shift from transport over water to road transport. In 1958 more than 40% of all greenhouses were still only accessible by boat or on foot. In 1972, after the project had been finished, lorries could reach every farm to load or unload.⁵³⁴

For many years the Dutch horticultural sector prospered. Exports improved and domestic consumption increased year after year. However, at the end of the 1980’s the situation slowly changed as competition from Southern European countries in particular grew stronger and stronger. Prices of greenhouse products were under strong pressure, while at the same time consumers became ever more critical of the quality of the products and the image of the sector was – whether or not deservedly – at stake. On the German market Dutch tomatoes were nicknamed *Wasserbomben* (water bombs; German) and Dutch cut flowers, especially chrysanthemums, were depicted as ‘poison flowers’.⁵³⁵ It looked as though

⁵³⁴ Van Doesburg *et al.*, ‘Honderd jaar praktijkonderzoek’, 1999, pp. 71-72; Buurma, ‘Dutch agricultural development’, 2001, p. 24.

⁵³⁵ Buurma, ‘Dutch agricultural development’, 2001, p. 35.



Illustration 4.12. Cultivation of asparagus in 1911 in Bergen op Zoom.

After the 19th century asparagus were already being cultivated on a more or less large scale. At first the town of Bergen op Zoom, in the most western corner of Brabant, was an important centre. After World War I the northern part of the province of Limburg arose as a new centre of production. Nowadays asparagus cultivation can be found all over the sandy regions of the country. Most of the asparagus that are produced here are exported to Germany. Source: Collection Spaarnestad Photo/Het Leven.

Dutch horticulture would have to hand back its reputation as a supplier of high-quality commodities.

As a consequence and in a matter of years the Dutch share of German imports of fresh vegetables fell back significantly. Increasing sales problems and negative business results in glass culture were the outcome. The overall and painful conclusion was that the vegetable glass sector had aimed for much too high productivity instead of the specific demands of the market.

The only way to withstand this growing competition and meet the demands of the market was for the auctions to take up the task of gearing the various links of the production chain more efficiently. Moreover, a changing demand and the shift from small retail business to chain store business required new structures. This all led to a merging of 9 vegetable and fruit auction organisations together with the *Centraal Bureau van de Tuinbouwveilingen*, into a new sales organisation that was called The Greenery, in 1996. The Greenery became a distribution, sales and marketing company of fresh produce whose shares were owned by the horticultural cooperative VoedingsTuinbouw Nederland (VTN). It sold the products of the 2,500 joined producers and brought them actively and directly to the notice of the consumers.⁵³⁶

The establishment of The Greenery was in fact the final price of a comprehensive process of up-scaling and merging in the world of Dutch auctions that had occurred ever since the end of World War II. Ever since they had come about, auctions had played an important role in the development of horticulture. In time their activities and functions had expanded to become more than just a selling place for horticultural produce. As most growers brought their products to the auctions nearly every day, the auction had developed into an important meeting place where growers could get access to market information and exchange technical experiences. Starting from these traditions auctions also offered to host study groups and played a crucial role in financial transactions between growers and traders, as they, for instance, guaranteed the growers' payment for the products they sold at the auction.

Auctions had also undergone technical changes over the years. The auction clock, a holy institute for more than a century and considered to be the most suitable instrument for obtaining the optimal price fixing, lost its function. In the Westland district the auction clock to sell fresh vegetables turned for the last time in 1999.⁵³⁷

Shortly after the war, in 1947, there had been as many as 162 smaller and bigger vegetable and fruit auctions in the Netherlands. In 1992 there were 23 of them left and in 1996 shortly before The Greenery arrived on the scene this number had dwindled to thirteen for vegetables and fruit, seven for flowers and plants and only one for bulb flowers.⁵³⁸

At the end of the 20th century in terms of production value livestock farming was still the most important sector of Dutch agri- and horticulture, however it was closely followed

⁵³⁶ Van Adrichem, 'The Greenery in opbouw', unpublished student report.

⁵³⁷ Van Doesburg *et al.* (eds.), 'Honderd jaar praktijkonderzoek', 1999, p. 156.

⁵³⁸ Kemmers and Gijsberts, 'Centraal Bureau van de Tuinbouwveilingen', 1992, pp. 182-183; Silvis (ed.), 'Handboek agrarische economie en beleid', 2002, pp. 106-107.

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by the horticultural sector (Figure 4.17). The latter had gained in importance especially since the 1970's. Over the years the total production value of the horticultural sector had risen to as much as 13,330 million guilders in 1994-97, or 37.6% of the agricultural and horticultural sector as a whole and this share continued to grow thereafter.⁵³⁹

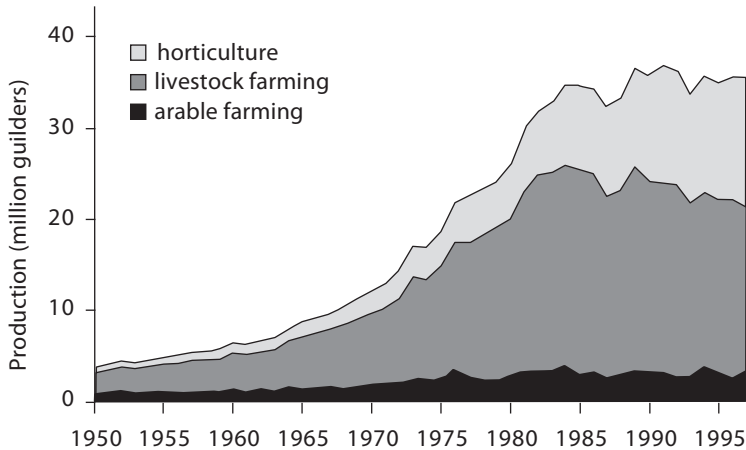


Figure 4.17. The production value of arable farming, livestock farming and horticulture in million guilders, 1950-97.

After: LEI/CBS, 'Landbouwcijfers'.

⁵³⁹ LEI/CBS, 'Land- en tuinbouwcijfers'.

Epilogue

Five centuries of farming – some outlines

Over the last five centuries agriculture in the western world has profoundly changed in character. From being a 'strategy for survival' it has evolved into an economic sector – some prefer to speak about agri-business – that employs only a limited group of people in a direct sense. Yet the country man of 1500 and the high-tech farmer of today do indeed still have a lot in common. Because no matter whether you are talking about medieval farming or ultramodern agri-business with all its technologies and high-grade inputs, it is still all about managing, or rather trying to manage biological processes. It is impossible to think of one sort of farming that is not based on biological principles. And this is what ties agricultural production to the pace and character of the reproduction processes of animals and plants.

At the end of the Middle Ages most Europeans lived their life as a farmer. And although we are used to calling them 'farmers', being a farmer then was not so much their profession as a way of life, or rather, a means of survival, as hunting and gathering had been many thousands of years earlier. The surpluses these farmers produced were small, as productivity of their crops and livestock was low – at least seen through our modern eyes. Diseases and plagues threatened their crops time and time again, not to mention the fickleness of the climate. Crop failures occurred at great regularity and often had catastrophic consequences. Livestock were afflicted by epizootics on a scale that is hard to imagine, despite our own, contemporary experiences with foot and mouth disease or swine fever. Great numbers struggled to survive and lived a life on the brink of a minimum that was needed to exist. The margins between abundance and scarcity, between life and death were small. Again and again people were subject to inconceivable evil-fated changes of life. Told in these terms an image arises that easily evokes associations with what comes to us daily through the media about the life of many in greater parts of Africa, Asia, or South America.

It is all the more remarkable how, during the Late Middle Ages in this part of Europe, forms of agriculture came into being that were unbeatable in terms of performance and that impressed contemporaries to a high degree. Farmers in the Low Countries not only produced a large variety of food products, but also a large range of non-food crops that were sold to all kinds of industries as their raw material. At first it was the highly urbanised economy of Flanders which stimulated the origination of farming systems of an unprecedented technological level. Their crops produced yields that were not surpassed until the late 19th century. The same effect resulted – some time later – from a rapidly growing urban economy in the northern Dutch provinces during the Dutch 'Golden Age'. Foreign travellers visiting the young Republic were full of admiration for the livestock farming and arable farming they witnessed. They saw highly specialised and commercialised farms producing high-grade products for a complex, urban market. As such farming in the Northern Netherlands made an important contribution to all the 'golden' developments in this so famous, illustrious period in Dutch history. As such the basis was laid for its later proverbial labour- and capital

intensive character and its great variety in different styles of farming. The latter not only goes for farming in the coastal provinces, but also for farming in the interior. Meanwhile, the rural economy of the sandy districts in the east and the south – for a long time considered to be introverted and closed – became interwoven with the strongly developing urban economy in the coastal provinces, each in its own typical way.



This illustrious period of growth and flourish was followed, however, by an extended period of economic stagnation and even decline. The prices of agricultural products fell and the stranglehold the tax system had on farming only worsened the situation. Farmers were mangled between decreasing revenues and increasing costs. Yet, this long period of economic decline, which continued until the middle of the 18th century, did not simply mean a return to older or less developed forms of farming. On the contrary. In spite of the worsening economic situation a number of remarkable innovations were introduced, such as new, more efficient types of plough and a number of implements designed to reduce (labour-) costs. Moreover, farmers learned to handle new and for them – literally – exotic crops like the potato and tobacco. It was these innovations that brought farming on balance to a higher level. And that was something farmers benefited from when, during the second half of the 18th century, things started changing for the better again.

Also on a European scale the 18th century was a time of important agricultural innovation. In this connection some historians even talk about an agricultural revolution; others – conversely – rather avoid the concept. However, unmistakably, everywhere in this period innovations occurred in farming that brought it to a higher, more productive level. Thus it was able to feed the fast growing urban component of European society in a more or less sustainable way. It appears as though it was also able to escape from the classical Malthusian field of tension between growth and food production for the first time in its history. The potato disease that struck Europe in 1845 and the following years is seen by some historians as the last, classic subsistence crisis.

The renewed growth and expansion that took shape after the mid-18th century, was only the prelude to the changes that were so typical for the 19th century. One of the most elementary developments was the fact that agriculture became a domain of science. Proto-scientists had for a long time been busy on the problem of soil fertility and plant nutrition. The great breakthrough came with the work of Von Liebig, when he published his theories in 1840. However, at least as influential was the development of the ammonia syntheses by the German chemists Haber and Bosch. Their procedure allowed nitrogen fertilisers – nitrogen being the key element for all forms of life on earth – to be produced in principle in unlimited quantities, although at the cost of an extremely high input of energy; which, however, had an unexpected sustainable aspect to it.⁵⁴⁰ Yet, the effect of artificial fertilisers

⁵⁴⁰ Smil, 'Enriching the Earth', 2001. Smil argues that nowadays 33 to 40% of the world's population is directly dependent on this high energy consuming Haber-Bosch process.

would not have been that great, if at the same time plant breeders had not come up with new crop varieties adapted to the increasing advantages of fertilisers.



For Dutch agriculture the great changes got going only around 1850, stimulated by a period of free trade and the revolution in transport that occurred with the arrival of steamships and railways. The latter caused the traffic-geographical map of Europe (and the world) to take on fundamentally different dimensions. The virtual focus of the European agricultural economy shifted from Amsterdam to London. The new ways adopted by farming were especially aimed at the increasing demand for more ‘luxury’ products (dairy products, meat, vegetables, fruit, flowers, etc.); these were orientations especially suitable for small farming. Horticulture in particular, already an important sector in the 17th century, aimed increasingly at the ‘growth market’ on the other side of the North Sea. In the sandy districts, in the north-eastern and eastern parts of the country, these things led to the birth of a new category of ‘mini-farms’, rapidly and drastically changing vast parts of the countryside and rural society.

However, the big changes in the field of transport soon also showed their downside when European markets were flooded with grain from the ‘New World’, from the 1860’s onwards, causing prices to fall. The ‘great agricultural depression’ was indeed primarily a grain crisis for the grain-producing arable farmers. However, even more important were the deeper structural consequences. The prices of arable farming products not only fell, they remained low in the long term, causing the daily bread of the European consumers to become cheaper. And as a result they could afford to buy more of the products Dutch farmers and horticulturists had specialised in. Meanwhile, livestock farmers were pleased to find that the prices of fodder products – their base material – also fell. As such the basis was laid for what in the public mind about a hundred years later became known as the ‘bio-industry’.



From the 1890’s onwards livestock farming also rapidly changed in character as factory dairying spread. Creameries – usually established as cooperatives – not only produced a product of higher quality than the farmers could – especially in the sandy districts – they also improved the accessibility of the market as these creameries enabled them to get around the so detested intermediate trade. Usually the cooperative creamery was a leg up to other sorts of cooperative enterprises, such as buying societies, farm credit banks and societies in the field of livestock breeding. Poultry farming developed into a *dezentralisierte Großindustrie* (a decentralised big industry) – as the German agronomist Julius Frost notably characterised it – when farmers/poultry-keepers organised themselves into cooperative societies to take advantage of all kinds of benefits of scale. Together, these closely interwoven innovations brought about the emancipation of the small farmer. On the stream of a growing economy

many managed to obtain a more or less self-employed living as a farmer. However, for many the unforeseeable reverse of this process was a dependence on markets abroad.



Meanwhile, worldwide agricultural production had increased and together with the rather unstable economy, prices fell back to a precarious level in the course of the 1920's. In 1928 the break came and the agricultural sector seemed to be close to a fall. At first the government refrained from interfering, but from 1931 onwards it came up with a rapidly increasing and comprehensive complex of statutory measures to preserve the sector from a total collapse. The various relief measures were connected with far-reaching production restrictions that caused great difficulties especially for small farmers. The economic weakness of these small farms was in fact the result of their own success in the pre-war period under the regime of a growing economy, on the basis of many sorts of cooperative entrepreneurship and stimulating agricultural policy. In essence the problem, soon to be called the *Kleine-boerenvraagstuk* (Smallholders' problem), had its origin in the discrepancy between the available workforce and the area of land, resulting in much too low labour productivity. As such, however, this was not a problem exclusively connected with small farming in the sandy districts. It occurred to a greater or lesser degree in the other sectors of Dutch agriculture as well.

Not incidentally, the government with its restrictions on production linked to the relief measures had en passant exceeded an important threshold. Until then its agricultural policy had been a facilitating one, trying to stimulate only developments that were on-going. From now on, however, crisis legislation provided the authorities with the possibility of intervening deeply and directly with the economic freedom of every individual farmer. As such the basis was laid for a policy that was to be expanded further after the World War II.



In the 1950's the Dutch countryside was the domain of agriculture as never before. Never had there been so many people active as farmers, land labourers or market gardeners, or with an occupation directly linked to the farming business. The countryside was the farmers' land; countryside and agriculture were as good as synonymous. However, as the economy expanded, especially after 1960, this would change rapidly and profoundly. This economic growth went along with a rapid increase in the wage level, also in the farming sector. This meant that farmers had to cope with ever increasing labour costs. Cutting these costs therefore became the primary strategy for renewing their farming business. As for their own income, it meant that they had to produce substantially more to achieve a similar level of income to the other sectors of the economy, since the prices of their products hardly increased.

These diverging trends in the price of labour versus the price of their products was now the motor of a complex of mutually interwoven processes of intensification, mechanisation, rationalisation, scaling-up and specialisation that would change agriculture technically in an inconceivable and unprecedented way. For the first time in the ten millennia long history of

farming a rise in productivity went along with a discharge of labour. After 1960, in particular, many felt forced to look for a living outside agriculture.

The government supported all this with unprecedented efforts in the field of scientific research, education and advisory services. Moreover, an active structural policy was set up to rationalise the agricultural production process. An important instrumental part of that policy were the land consolidation projects that changed the farmers' familiar landscape to meet the requirements of a more mechanised and rationalised sector. With the help of considerable state subsidies the accessibility of the country was improved, farm buildings were shifted out of the villages and the size and shape of field plots were adapted. And this all was meant to create modern farms that could produce with low costs of labour per unit of product. Yet, the government saw the scaling up of farming and the process of intensification and all that was connected to it, not so much as autonomous values, not as aims on their own, but as basic necessities for a sound, agriculture-based country culture.⁵⁴¹



At first these developments aimed at growth and productivity increase met with hardly any social resistance. A sector so much geared to growth, where all kinds of new technologies were being implemented, fitted in very well with the then expanding economy. The redundancies that were annexed to it could easily be accommodated by the growth in the other sectors of the economy. However, around the mid-1970's it became clear that aims set less than one generation earlier were no longer sufficient. Suddenly, completely different norms and values became standard, and an explosive growth in production meant that production control and even production reduction were the prevailing problems agrarian policy makers struggled with. Moreover, rapidly increasing intensity had indeed brought the income of farmers to a reasonable level; it also put a heavy burden on the environment, on nature and on the landscape. The public increasingly questioned the intensive methods of production, the claims on scarce raw materials, and the quality of the products themselves.

However, it was not until the mid-1980's that the course was changed. Thereafter in livestock farming, costly measures to curb the environmental pressure were widely accepted. In arable farming it led to the implementation of high-grade technologies and methods that soon became known as 'precision farming'. And in the field of crop protection biological pest control methods made unexpectedly successful progress. So the concern about the environment and methods and technologies that were grafted onto this increasingly made up the technological regime in agriculture.

At the same time, however, it became a common thing for laboriously won farming to be taken out of production and returned to nature. And this was something that was absolutely incomprehensible to farmers, as it went against their most elementary emotions of continuity and being a farmer.



⁵⁴¹ Nooij, 'Sociologie, van modern naar weerbarstig', 2001, pp. 6-7.

On the threshold of the third millennium the role and future of agriculture as well as its place in Dutch society is under full discussion. Some say that the end of it is in sight. And, indeed, the number of farmers is falling at an alarmingly high pace, especially in the last couple of years. Others, however, continue to maintain that agriculture and horticulture are alive and kicking. And although land use in the country will remain chiefly agricultural, the countryside is no longer the exclusive domain of the farmer. In some circles it has become fashionable to speak about the transformation of an (agricultural) production room to a (multi-functional) consumption room. Yet, what is certain is that many farmers and horticulturists do see opportunities to make a living. They prove themselves able to make the most of these chances, as they follow special 'market niches' while being very innovative in the process. Variety remains, as ever, an important feature. More than ever before, it seems, every farmer is farming in his own way in the field of tension between the ever present and regulating authorities, the market and technology supply. At the end of this book it will not come as a surprise to the reader that they unremittingly know how to adapt and change.

Annexes

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Glossary

Aandijking (schorren en kwelders):	washed-up land along the coast
Aardappelmeelverkoopbureau:	potato starch sales agency
Aardappelmoetheid:	potato sickness
Akker:	arable land
Arrondissement:	administrative district (in French period)
Beklemde meier:	life-long lease-holder (only in Groningen)
Belangengroep voor de rechten van alles wat leeft:	pressure group for the rights of everything that is living
Bieten dunnen:	thinning out beet seedlings
Blauwe stad plan:	blue city plan (in Groningen)
Bolster/bonk:	topmost peat layer
Boterwet:	law concerning butter export
Bouwing:	broad-based, large type of farm (especially in river clay district)
Broeibak:	hot bed
Centraal Bureau van de Tuinbouwveilingen:	Central Agency of Horticulture Auctioning
Champignonteelt:	mushroom production
Compagnie:	company
Coöperatieve Rundveeverbetering Delta:	Cooperative Cattle Improvement (Organisation) Delta
Coöperatieve Nederlandse Champignonskwekersvereniging (CNC):	Mushroom Growers Society
Cope:	literally: contract; characteristic type of a settlement in Holocene part of the country
Crisis-varkenswet:	crisis pig act
Crisis-zuivelwet:	crisis dairy act
Cyclomaaier:	cyclomower
Delven:	digging (of madder)
Derde garve:	the third sheaf
Der ideale Staat:	the imaginary state (German)
Der isolierte Staat:	the isolated state (German)
Dezentralisierte Großindustrie:	decentralised mass production (German)
Dienst voor de Kleine Boerenbedrijven:	Small Farmers Service
Dorsrol/dorsblok:	threshing block
Drieslagstelsel:	three course rotation system
Dries leggen:	leaving arable land uncultivated; ley
Droogmakerij:	reclaimed (natural) lake
Druivenserre:	grape house
Dubbel-doel type:	dual purpose type of cow
Dubbeltjesgewas:	penny crop

Glossary

Duits:	indigenous
Éénpaardsboer:	one-horse farmer
Eenleeftijd-systeem:	one age system
Eng; enk:	see Essen
EPIPRE:	EPIdemie: epidemic, PRedictie: prediction, PREventie: prevention
Es:	regional variant of open field of arable land
Etage bedrijf:	mixed farm
Forceren:	force
Garancine:	madder preparation
Gardenier:	gardener
Garfpacht:	sheaf rent in share tenancy
Geleide bestrijding:	supervised pest control
Glazen stad:	city of glass
Gouden Eeuw:	Golden Age
Goudse kaas:	Gouda cheese
Grup:	dung channel
Grup-stal:	tie-up cow house
Halfwinning/halfpacht:	half tenure
Hallehuisboerderij:	farmstead type
Handkrachtfabriek:	small manually operated factory
Hannekemaaiër:	seasonal worker from Westphalia
Heemraadschap:	polder-board
Heerd:	type of large farm (especially in Groningen)
Hennepwerv/hennep tuyn:	hemp garden
Herfstboter:	butter produced in autumn
Het Landbouwschap ('het schap'):	the Agricultural Board
Het Nederlandsch Landhuishoudkundig Congres:	Dutch Agricultural Congress
Het Nederlandse Rundvee Stamboek:	Dutch Cattle Herdbook
Het Nederlands Rundvee Syndicaat:	the Dutch Cattle Syndicate
Hoppekuilen:	small plant hills for hop cultivation
Industrie-melkbedrijf:	industrial dairying
Jammerkoorn:	misery grain
Jenever:	geneva, gin
Kaasstad:	city of cheese (Alkmaar)
Kamp:	small plot of arable land; usually of one individual farmer
Kapberg:	roofed stack for grain and hay
Kiemen:	cuttings
Kleine-boerenvraagstuk:	small holder's problem
Kolonie:	colony

Kom:	low-lying river basin
Koninklijk:	Royal
Koolschuur:	cabbage shed
Kooltjer:	cabbage grower
Kop-hals-romp farm:	head-neck-trunk farm (type of farm)
Koren:	bread grain
Katholieke Nederlandse Boeren- en Tuindersbond (KNBTB):	Catholic Farmers' and Horticulturists' Union
Kwel:	seepage
Kwelder:	<i>see</i> aandijkingen
Kwelkaden:	seepage embankments on the landside of dikes
Landbouwgebied:	agricultural district
Landbouwmaatschappij:	Farmer's society
Landbouwstelsel:	farming system
Land- en Tuinbouworganisatie Nederland (Ito- Nederland):	Farming- and Horticultural Organisation of the Netherlands
Landinrichtingswet:	Land Reconstruction Act
Langhuis:	long house (type of farm)
Last:	volume of grain; 30.1 hectolitre
Leidse kaas:	skimmed milk cheese
Ligboxenstal:	cubicle stable
Lijnrijder:	merchant distributing flowers
Locomobiel:	mobile steam engine
Londense biggen:	London piglets
Maal- en menggebod:	grind and blend order
Maire:	mayer (French)
Maiskern:	study club to develop the cultivation of green maize
Markewet:	Enclosure Act
Meekrap:	madder
MeerJarenAfspraak-Energie (MJA-E):	Long Term Agreement - Energy
Meerjarenplan Gewasbescherming:	Long-term Programme for Crop Protection
Meerjarenplan voor ruilverkaveling :	Long-term Programme for Land Consolidation
Meestof:	madder kiln
Melkmouw/melkaad:	setting pan for de-creaming milk
Milieucoöperatie:	environmental cooperative
Moedernegotie:	mother of all trades
Morgen:	regional land measure; 0.86 ha
Naturalwirtschaft:	natural economy (German)
Nederlandse Boerenbond:	Dutch Farmers' Union
Nederlands Christelijke Boeren- en Tuindersbond (NCBTB):	Dutch Protestant Farmers' and Horticulturists' Union

Glossary

Nederlands Landbouw Comité:	Dutch Agricultural Committee
Niet-grondgebonden landbouw:	foot-loose livestock farming
Nieuwland:	newly reclaimed marine clay polders
Nota Gewasbescherming:	Memorandum on crop protection
Ontpolderen:	to de-polder, <i>see</i> polder
Ontwikkelings- en Saneringsfonds voor de Landbouw (O&S fonds) :	Development and Reconstruction Fund for Agriculture
Ontwikkelings- en stimuleringsfonds:	Development and stimulating fund
Opeenzetten:	putting into rows
Opgevaeren land:	low lying clay soils covered by a layer of sand making it suitable for horticulture
Osseboeren:	farmers keeping oxen
Oude bouwlandgronden:	old arable soil
Phytopatologische Dienst:	Plant Protection Service
Plaggenbodem:	sods soil
Plaggenmest:	sod compost
Plat glas:	flat glass
Pluimveeregeling:	Poultry Regulation
Polder:	land reclaimed
Pondemaat:	regional land measure; 0.37 hectares
Pondgaarder:	grain selling agent
Poonschuit:	type of ship used by the market bargeman
Potstal:	pit stable for producing compost
Proefstation voor de Champignoncultuur:	Research Station for Mushroom Cultivation
Racine:	purified root parts of madder
Relatienota:	Relation Memorandum
Rijdende melkontvangst (RMO):	mobile milk collector
Rijksbotermerk:	government control mark on butter
Rijkslandbouwleraar/rijkslandbouwconsulent:	agricultural adviser
Rijkslandbouwproefstations:	governmental agricultural research station
Rijksveeteeltconsulenten:	cattle breeding advisers
Roede:	traditional land measure; 3.66 metres
Rolblok:	roller
Ruilverkaveling:	land consolidation project
Runderpest:	cattle plague
Scharrelei:	free-range egg
Scharrelkip:	free-range hen
Schrepel:	short-handled weeding hoe
Setters:	seed potatoes
Sikkel:	sickle
Spoelingsdistrict:	in this area distiller's wash or draff (spoeling) was used to fatten the pigs

Staand glas:	standing glass
Stand:	class
Standorganisatie:	class based pressure group
Stelp:	type of farmhouse where living- and working areas are covered by one large roof (especially in Friesland)
Stolp:	type of farm (especially in Noord-Holland)
Stooktomaten:	hothouse tomatoes
Straatvuil:	streetsweepings
Strandwal:	old, sunken dune
Streekverbetering:	Rural Area Development Programme
Strook:	strip (of land)
Structuurpolitiek:	political planning aimed at economic growth
Sûkerei-kroadtsje:	chicory wheelbarrow (especially in Friesland)
Superheffing:	superlevy (on milk production)
Tabakker:	tobacco grower
Tarwecentrale:	Wheat Central; central buying agency for wheat
Tarwewet:	Wheat Act
Teems:	strainer
Terpaarde:	the (very fertile) soil that was excavated from ancient, artificially raised dwelling mounds in the northern coastal plain
Test:	glazed earthenware pottery
Til:	loft
Toemaken:	preparing and cultivating of former peatlands
Tulpomanie:	tulpomania
Twe op vive:	two to five
Vak:	section
Vaste zaadpacht:	rent payed in fixed amount of grain
Veenboekweit:	moor grown buckwheat
Veenbranden:	fire on the moors
Veenkoloniën:	Peat Colonies (agricultural district)
Veld:	see Es
Venlo-kas:	Venlo greenhouse; type of glasshouse
Vereniging van Inheemse Tarwe-Afnemers (VITA):	Society of Native Wheat Buyers
Vergetreidungs-Prozess:	arablization (German)
Vervening:	peat mining/digging
Verzendvereniging:	dispatch society
Vierendeel:	traditional volume measure (of butter); 40 kilogrammes
Vlasser:	flax worker

Glossary

Vol bedrijf:	farm that had full rights in the commons
Voorling:	regional land measure; 208.33 metres
Vruchtbomencarbolineum/VBC:	tar wash
Waard:	flood plain
Wale plough:	a big, heavy gallows plough
Wanmolen:	winnowing mill
Warme stoof:	heated kiln (for processing madder)
Wasserbomben:	water bombs (German)
Welbegrepen eigenbelang:	well understood self-interest
Wet Investeringsrekening or WIR:	Act to stimulate investments
Wijken:	network of canals and subcanals dug into peat
Woeste gronden:	waste lands
Zandgebieden:	sandy districts
Zeeuws vlegelbrood:	Zealand flail bread
Zelf-kazer:	farmer making cheese on own farm
Zesrijer:	six row beet harvester
Zicht:	short scythe
Zoetboeren/consumptiemelkers:	farmers producing milk for household consumption
Zuivelconsulent:	dairy adviser

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